DRAFT ECONOMIC ANALYSIS OF CRITICAL HABITAT DESIGNATION FOR THE O'AHU 'ELEPAIO

August 2001

Draft - August 2001

Prepared for:

Division of Economics
U.S. Fish and Wildlife Service
4401 N. Fairfax Drive
Arlington, VA 22203

Prepared by:

Decision Analysts Hawaii, Inc.
1655 Kamole Street
Honolulu, Hawaii 96821

under subcontract to:

Industrial Economics, Incorporated
2067 Massachusetts Avenue
Cambridge, Massachusetts 02140

Send comments on the economic analysis to:

Field Supervisor
Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
P.O. Box 50088
Honolulu HI 96850-0001

TABLE OF CONTENTS

FIGURES

TABLES

FOREWORD

This analysis of the potential economic impacts associated with designation of critical habitat for the O'ahu 'elepaio commenced in the spring of 2001. Since that time, the analysis has proceeded on an aggressive schedule to meet a court-ordered deadline for finalizing the designation by October 31, 2001. The timeline for completing this rule is one of the most rigorous faced by the U.S. Fish and Wildlife Service (the Service).

On May 11, 2001, the U.S. Court of Appeals for the Tenth Circuit issued a ruling that addressed the analytical approach used by the Service to estimate the economic impacts associated with the critical habitat designation for the southwestern willow flycatcher.[1] Specifically, the court rejected the approach used by the Service to define and characterize baseline conditions.[2] As a result, the Service is in the process of revising its methodology for assessing the effects of critical habitat designation to include an expanded consideration of baseline conditions.

However, this ruling was delivered after the economic analysis for the O'ahu 'elepaio designation was well underway. As a result, this fact, combined with the aggressive schedule of the rulemaking, has prevented this version of the economic analysis from fully exploring all of the baseline issues related to the proposed critical habitat rulemaking. In sum, while this analysis attempts to comply with that ruling, some baseline conditions may not be described fully.

However, the analysis does follow all federal requirements and procedures for conducting economic analyses in addition to following general economic theory on the methodological approach for cost-benefit analyses. Specifically, Executive Order 12866, *Regulatory Planning and Review*, requires all federal agencies to conduct economic analysis of significant regulatory actions as a means to improve regulatory decision-making.[3] To assist agencies in carrying out these analyses, the Office of Management and Budget

1. New Mexico Cattle Growers Association, et al. v. U.S. Fish and Wildlife Service, No. 00-2050, U.S. Court of Appeals, Tenth Circuit, May 11, 2001.
2. In a previous case, Middle Rio Grande Conservancy District v. Bruce Babbitt, No. CIV 99-870, 99-872 and 99-1445M/RLP (consolidated), U.S. District Court for the District of New Mexico, the court similarly questioned the approach used by the Service to identify the economic effects of designating critical habitat for the Rio Grande silvery minnow. Although the court openly questioned the definition used by the Service to establish the baseline of the economic analysis, the court did not expressly rule on this approach as it set aside the rule for other reasons.
3. Executive Order 12866, *Regulatory Planning and Review,* September 30, 1993.

(OMB) has issued guidelines on how to conduct benefit-cost analyses on government actions, which this analysis adopts.

In sum, this analysis follows the generally accepted standards on performing cost-benefit analyses on government actions and provides the Secretary with the information required to make a decision about the final designation of critical habitat for the O'ahu 'elepaio. The Service intends to issue a final analysis, which will consider public comment in addition to exploring more fully some of the baseline conditions of public interest.

PREFACE

CONTENT AND PURPOSE

This report assesses the economic impacts that may result from the designation of critical habitat units for the endangered O'ahu 'elepaio *(Chasiempis sandwichensis ibidis)* ('elepaio) on the island of O'ahu in the state of Hawai'i. It was prepared for the U.S. Fish and Wildlife Service (the Service) to help them in their decision regarding designating critical habitat for the 'elepaio.

As required by the Endangered Species Act (ESA), as amended, the decision to designate a particular area as critical habitat must take into account the potential economic impact of the critical habitat designation. If the economic analysis reveals that the economic impacts of designating any area as critical habitat outweigh the benefits of designation, then the Service may exclude the area from consideration, unless excluding the area will result in the extinction of the species.

ORGANIZATION

The report is organized into seven sections:

— Section 1: O'ahu 'Elepaio and the Proposed Critical Habitat

This section provides information on the 'elepaio and on the proposed critical habitat units.

— Section 2: The Endangered Species Act

Relevant information from the ESA is presented in Section 2, including the role of the economic analysis in designating critical habitat, the role of critical habitat designation in protecting threatened and endangered species, and requirements for consulting with the Service to insure that certain actions do not endanger listed species or their habitats.

— Section 3: Existing Protections

Section 3 presents information on existing regulations and land management policies that protect wildlife species or their habitats. The information is used in defining a “baseline scenario,” which assumes no critical habitat designation.

— Section 4: Physical and Socioeconomic Profile of O'ahu

To provide the context for evaluating the economic impacts of the proposed critical habitat designation, this section presents a physical description and socioeconomic profile of the Island of O'ahu.

— Section 5: Improvements and Activities in the Critical Habitat Units

Section 5 presents relevant information on the current and planned improvements and activities in the critical habitat units, assuming the baseline scenario of no critical habitat designation.

— Section 6: Methodology for the Economic Impact Analysis

Section 6 gives the general approach used to estimate the economic impacts of the proposed critical habitat designation.

— Section 7: Potential Economic Costs and Benefits of the Critical Habitat designation

The final section presents the analysis estimating (1) changes to projects, land uses, and activities that are likely to occur as a result of the proposed critical habitat designation, and (2) the associated economic costs and benefits of these changes.

TERMINOLOGY

The following FWS terminology is *italicized* throughout the report for the benefit of readers who are unfamiliar with the terminology and want to be reminded that FWS has given specific meanings to these words and terms: *Federal involvement, Federal nexus, occupied, unoccupied*, *primary constituent elements, jeopardy, adverse modification,* and *take.* The terms are explained in Section 2.

MAPPING ACCURACY AND ADJUSTMENTS

Acreage estimates presented in Tables ES-1 and used in the text are based on digitized maps and acreage calculations provided by the Service. The data files for these maps were generated by the Service, other Federal agencies, state and county agencies, and private contractors. For the most part, the digitized maps are reasonably accurate at a scale of 1:24,000. Nevertheless, they are not exact: the mapped locations of certain features (borders, roads, structures, etc.) sometimes deviate from their actual locations; maps from different sources may differ as to the locations of certain features; mapped borders of adjacent parcels may not be in perfect alignment even if they come from the same source; etc. As a result of these mapping discrepancies, some acreage estimates may be incorrect (when a

slight discrepancy extends over several miles, the estimate can amount to over 100 acres); area components may not sum to the whole area; and slivers of some land may be included in a proposed critical habitat unit when the intention was to exclude this land (e.g., a sliver of urban or agricultural land may be included inadvertently).

For the most part, no adjustments were made for known discrepancies in acreage estimates because of the difficulty of determining all the associated adjustments. However, acreage discrepancies are noted in the text as appropriate.

But adjustments were made to land-ownership acreage figures to incorporate new data that reflects changes in land ownership—in particular, the purchase of private land by the Federal, state and county agencies. As a result, land ownership figures used in this report differ from those given in the proposed rule.

ECONOMIC CONSULTANTS

The analysis was performed by Decision Analysts Hawaii, Inc. (DAHI), a Hawaii-based economic consulting firm, under contract to Industrial Economics, Incorporated (IEc), an economic consulting firm located in Cambridge, Massachusetts. In conducting the analysis, DAHI worked with the Service at the local level, while IEc worked with the Service at the national level.

EXECUTIVE SUMMARY

INTRODUCTION

The purpose of this report is to identify and analyze the potential economic impacts that would result from designating critical habitat for the O'ahu 'elepaio, a small Hawaiian forest-dwelling bird that was listed as endangered in April 2000 by the U.S. Department of Interior, Fish and Wildlife Service (the Service). This economic analysis was prepared for the Service by Decision Analysts Hawai'i, Inc. (DAHI), a Hawaii-based economic consulting firm, under contract to Industrial Economics, Incorporated (IEc).

Section 4(b)(2) of the Endangered Species Act (ESA) requires the Service to designate critical habitat on the basis of the best scientific data available, after taking into consideration the economic impact and any other relevant impacts of specifying an area as critical habitat. The Service may exclude an area from critical habitat designation if it determines that the benefits of excluding the area outweigh the benefits of including it unless it determines, based on the best scientific and commercial data available, that this will result in the extinction of the species.

Critical habitat designation can help focus conservation activities for a listed species by identifying areas that are essential to its conservation, and by heightening the awareness of Federal land management agencies and the public about the importance of critical habitat. In addition to its informational role, the critical habitat designation may provide protection where significant threats have been identified. This protection derives from the ESA, section 7, which requires Federal agencies to consult with the Service in order to ensure that activities they fund, authorize, or carry out are not likely to destroy or *adversely modify* the critical habitat.

O'AHU 'ELEPAIO

Less than 2,000 O'ahu 'elepaio are distributed in six core subpopulations and several smaller subpopulations (see Figure ES-1) in Oahu's two mountain ranges. 'Elepaio occur in a variety of forest types, but they are most common in riparian vegetation along streambeds and in mesic forest having a tall canopy and a well-developed understory. Forest structure appears to be more important to 'elepaio than is plant-species composition and, unlike many Hawaiian forest birds, 'elepaio have adapted relatively well to disturbed forest composed of introduced plants.

Despite its adaptability, the O'ahu 'elepaio has declined precipitously since the arrival of humans to Hawai'i, and has disappeared from many areas where it was once commonly found. In 1975, 'elepaio inhabited approximately 51,620 acres on O'ahu compared to about 14,000 acres today.

Many areas on O'ahu that recently supported 'elepaio and still contain apparently suitable forest habitat are currently *unoccupied,* demonstrating that suitable habitat loss is not the only threat. Instead, the recent decline in 'elepaio populations has been caused primarily by the black rat, which feeds on 'elepaio eggs, and the mosquito which carries diseases, particularly avian pox and avian malaria.

PROPOSED CRITICAL HABITAT DESIGNATION

The Service has proposed that five critical habitat units totalling 66,354 acres be designated for 'elepaio (see Figure ES-1). These units, which are mostly located at the higher elevations of the Wai'anae Range and the Ko'olau Range, contain the diversity of forested ecosystems that are inhabited by 'elepaio and contain the *primary constituent elements* essential for its primary biological needs. Most boundaries of units coincided with the boundaries of state Forest Reserves, Natural Area Reserves, or other conservation lands.

About 14,030 acres (about 21%) of the lands proposed for critical habitat designation represent the current estimated range of the 'elepaio; that is, the approximate acreage of the *occupied* lands. The remaining 52,330 acres (about 79%) of *unoccupied* lands proposed for critical habitat designation include portions of the ‘elepaio’s historical range that were *occupied* in 1975. These *unoccupied* areas are included in the proposed designation because they are needed to provide sufficient land to support a population of 'elepaio large enough to be considered safe from extinction.

With few exceptions, the Service did not include urban and agricultural lands because they generally do not contain *primary constituent elements* essential to the conservation of the 'elepaio*, an*d so do not meet the definition of critical habitat. Also, the Service was unable to map the proposed critical habitat boundaries in sufficient detail to exclude all developed lands that do not contain the *primary constituent elements*. However, existing development features and structures that fall within the boundaries of the mapped units—such as buildings, roads, aqueducts, antennas, water tanks, agricultural fields, paved areas, lawns, and other urban landscaped areas that do not contain the *primary constituent elements*—are <u>not</u> proposed for critical habitat designation.

Table ES-1 summarizes information about each proposed critical habitat unit, including its acreage, the approximate acreage that is *occupied* and *unoccupied* by the 'elepaio, who owns the land, managed areas, and known improvements and activities within the unit. Explanatory information about the Table is provided in Table footnotes, the Preface, and Sections 1, 3 and 5.

METHODOLOGY FOR ECONOMIC IMPACT ANALYSIS

The focus of the economic impact analysis is on the changes that would result from the proposed critical habitat designation, and the economic costs and benefits associated with these changes. The changes are measured against a baseline scenario that assumes no designation, but does take into account all existing Federal and state protections for listed species, state and county land-use controls affecting public and private lands, and land management by various public and private organizations. Thus, the economic impacts of critical habitat designation are those which would occur over and above this baseline scenario.

It is this incremental economic impact information that is relevant to the Service as it considers whether to include in the final rule all of the lands they have proposed for critical habitat designation, or whether to exclude some lands because the cost of including them would be too high to the affected parties.

However, in deference to a recent court ruling, information is also provided on the costs and benefits attributable to the listing of the 'elepaio as an endangered species where such data for the estimates are reasonably available. This additional information on the baseline scenario allows a fuller appreciation of the economic impacts attributable to the species listing, versus the economic impacts attributable to the proposed critical habitat designation.

Highlights of the approach used to estimate the economic impacts of the proposed designation involved the following, as appropriate:

— Projects, Land Uses and Activities Subject to Analysis

The economic analysis focused primarily on the “reasonably foreseeable” projects, land uses, and activities that could affect the physical and biological features of the proposed critical habitat units. In turn, these were the activities that could be affected by the critical habitat designation.

— Background Information

In order to provide context for the analysis, and to the extent that information is reasonably available, background information is provided on projects, land uses, and activities that are subject to the analysis. Depending upon the situation, this background information may include any past and projected section 7 consultations, project modifications and associated costs, and benefits that would be attributable to the presence of the O'ahu 'elepaio.

— *Federal involvement*

For the current and planned projects, land uses, and activities that could impact the physical and biological features of the proposed critical habitat

units, the next step in the analysis was to determine *Federal involvement*. Federal agencies must consult with the Service whenever an activity they fund, authorize, or carry out may affect designated critical habitat. When consultations concern an activity on Federal lands, the relevant Federal agency consults with the Service. When consultations involve an activity proposed by a state or local government or by a private entity, the Federal "action agency" to the activity consults with the Service.

Activities on State, county, municipal and private lands that do not have a *Federal nexus* (i.e., they do not involve Federal funding, a Federal permit, or other Federal actions) are not restricted by critical habitat designation. Therefore, these activities were not addressed further in this analysis.

— *Adverse Modification* of Critical Habitat

In determining whether there is *adverse modification* to a critical habitat, the Service analyzes the proposed project, land use, or activity, and determines whether it will *adversely modify* the habitat containing the *primary constituent elements* regarded by the Service as essential to the conservation of the listed species.

If an action will not *adversely modify* the critical habitat, either directly or indirectly, the Service reaches a "no *adverse modification"* conclusion, and no further consultation with the Service is necessary. Except for the cost in time and effort to all parties involved in the consultation with the Service, the proposed project, land use, or activity will not be impacted by the critical habitat designation.

— Man-Made Features and Structures

In practice, the operation and maintenance of existing man-made features and structures (e.g., existing buildings, roads, aqueducts, telecommunications equipment, arboreta and gardens, and *heiau*) normally would result in a "no *adverse modification"* conclusion because they do not contain, and are not likely to develop, any *primary constituent elements.* In such cases no consultation, or a minimal informal consultation, may be required. Activities falling into this category were not considered further in the analysis

An equivalent interpretation is that existing man-made features and structures are unmapped holes located within the boundaries of a critical habitat unit, but these holes are not part of the unit.

— Focus on Incremental Impacts

The analysis evaluated the incremental economic changes that are expected to result from the proposed critical habitat designation over and above those resulting from all other existing Federal, state, and county land-use controls and environmental protections. If some other existing statute, regulation, or policy limits or prohibits a land use or activity, the economic impacts associated with those limitations or prohibitions are not attributable to critical habitat designation.

To determine these incremental economic impacts, the analysis compared a "with" critical habitat designation scenario against a "without" critical habitat designation (or baseline) scenario, and estimated the net change in economic activity that would be attributable to the proposed critical habitat designation. The difference between the two scenarios is the incremental change in economic activity that is likely to result from the proposed critical habitat designation.

— *Occupied* versus *Unoccupied* Critical Habitat

This economic analysis focuses on the portions of the proposed critical habitat units that are *unoccupied* by 'elepaio because the Service expects that any potential incremental economic costs and benefits from critical habitat designation will occur predominately on *unoccupied* lands. This reflects the fact that, for *occupied* lands, section 7 consultations with the Service are already required to ensure that proposed activities are not likely to *jeopardize* the continued existence of the species.

— Other Listed Species

Regarding the *unoccupied* portion of the 'elepaio critical habitat units, a distinction was made between areas where other listed species are known to be present, and areas where no known listed species are present. If other listed species are known to be on or near (within about one-third mile) of a project site or activity having *Federal involvement*, then consultation with the Service will already be necessary due to the existing species listing, even without the 'elepaio critical habitat designation. However, the critical habitat designation would result in an expansion of the scope of the consultation to consider whether the project would impact the *primary constituent elements* essential to the survival and recovery of the ’elepaio.

If a project is located in the *unoccupied* portion of the critical habitat, and no other listed species are known to be on or near the project site, then the critical habitat designation would trigger a section 7 consultation that would not otherwise be required.

— Changes in Consultations, Projects, Land Uses and Activities

For the remaining list of current and planned projects, land uses, and activities that are likely to be subject to consultation in actual practice—and consistent with the focus on incremental impacts—the next step in the analysis was to estimate incremental changes in the quantity and nature of the consultations and to estimate the changes that are likely to occur in such items as project designs, schedules, land uses, activities and programs.

In some cases, a project or activity can be modified during informal consultation with the Service to avoid adverse impacts on the species or its habitat. If not, the Service may determine during formal consultation that the project or activity can proceed as is, or that the project can proceed subject to "reasonable and prudent" changes. The latter occurs when the Service determines that the project or activity, as modified, will not *jeopardize* the continued existence of a listed species, or destroy or *adversely modify* its critical habitat to such an extent that the project appreciably diminishes the value of the habitat for the survival and recovery of the species.

The estimates reflect the availability of information which, in many cases, was limited.

— Economic Effects of the Incremental Changes

The final step in the analysis was to estimate the economic effects of the incremental changes in the consultations, projects, land uses and activities. The kinds of economic costs and benefits that were considered included, but were not limited to, changes in revenues, costs, employment, property values, and the distribution of benefits.

In many cases, some types of benefits and costs were impractical to value, largely due to the lack of market prices or existing economic studies on which to base values (e.g., the economic value of preserving certain species).

ECONOMIC IMPACTS

Overview of Economic Impacts

For the most part, the critical habitat designation would have modest economic impacts for the following reasons:

— Very few new developments, commercial projects, land uses, and activities are expected in the proposed critical habitat units. This is due to (1) lands that are largely unsuitable for development and most other activities because

of their rugged mountain terrain, lack of access, and remote location; and (2) existing land-use controls that severely limit development and most other activities in the mountainous areas of O'ahu.

— Some of the current and planned projects, land uses, and activities that could affect the proposed critical habitat units have no *Federal involvement* requiring section 7 consultation with the Service, so they are not restricted by the requirements of the ESA.

— Most of the activities where there is *Federal involvement* involve the operation and maintenance of existing man-made facilities and structures, so they would not be impacted by the critical habitat designation.

— Some activities would be subject to a minimal level of informal section 7 consultation because they do not adversely impact the 'elepaio or its habitat.

— For a number of the new projects, land uses, and activities that have *Federal involvement*, the incremental economic impacts over and above the economic impacts that would have occurred with existing Federal, state and county protections would be small or negligible. This reflects the fact that listed species (either 'elepaio or other listed species) are present in about half the acreage in the proposed critical habitat units. As a result, section 7 consultation will already be necessary in these areas to ensure that proposed activities are not likely to *jeopardize* the continued existence of the listed species.

In particular, the proposed critical habitat designation would range from no impact to modest impact on the following projects, land uses, and activities within the proposed critical habitat units:

— management of privately owned lands

— game hunting

— state parks, recreation area, and campground

— The Lyon Arboretum

— a DLNR nursery and staging area

— a satellite tracking facility at Ka'ala

— communications facilities

— power transmission lines

— farming and ranching

— water systems

— trails, roads, and helicopter landing areas

— urban development

— U.S. military activities

— residential use

— property values

— recovery from natural disasters

The larger economic impacts resulting from the 'elepaio critical habitat designation would be limited to projects and activities that: (1) are new or represent a major modification, addition or expansion; (2) have *Federal involvement*; (3) are located in the *unoccupied* portions of the 'elepaio critical habitat units; and (4) are located in an area where, like the 'elepaio, no other listed species are found on the project site or nearby. In view of items (3) and (4), the critical habitat designation would trigger a section 7 consultation that would not otherwise be required. Although such projects may occur some time in the future (e.g., a communications facility), no specific plans were identified.

Economic benefits occurring as a result of designating critical habitat for the O'ahu 'elepaio, and the related actions taken to control threats to the 'elepaio (principally rodent control), would include:

— an expansion in ecotourism

— the economic benefits of preserving the 'elepaio

— the economic benefits of preserving other species that would increase in number and range as a consequence of the rodent control

Cost of Managing Land to Protect Critical Habitat

A major concern among private landowners is that the critical habitat designation will result in requirements for additional land management to protect the O'ahu 'elepaio, such as rodent control, fire prevention, etc. Because of the large amount of land proposed for designation, such additional land management could be expensive.

However, the critical habitat designation would not require additional land management beyond what is required by the ESA. That is, the critical habitat designation would not require (1) creating any reserve, refuge, or wilderness areas; (2) fencing for any reason; (3) removing rodents, ungulates, or weeds; (4) closing any area to hunters or hikers; (5) initiating recovery projects to reintroduce 'elepaio or augment existing populations; or (6) preparing special land-management plans.

If an area is selected for additional land management to assure the survival and recovery of the O'ahu 'elepaio, the decision would be based on (1) the quality of the habitat for 'elepaio and, possibly, whether 'elepaio are present in the area; (2) other considerations, such as the quality of the forest, the presence of other listed species, watershed management, and good land stewardship; and (3) financial incentives in the form of Federal and state partnership programs.

Furthermore, the decision to manage the land so as to control threats to the 'elepaio is a separate decision from the critical habitat decision. Thus, the cost of these land management activities would not be attributable to the critical habitat designation.

Game Hunting

One of the major issues surrounding the critical habitat designations proposed for Hawai'i concerns the management of game-mammal populations (e.g., feral pigs and goats). However, the Service regards ungulates at their current density as a secondary threat to the survival and recovery of the O'ahu 'elepaio, particularly since the highest density of 'elepaio is found in an area having a high density of feral pigs.

Based on the Service's draft recovery plan for the 'elepaio, and assuming no change in game management by DLNR in favor of increasing game-mammal populations on O'ahu, the critical habitat designation is expected to have no significant impact on (1) the number of consultations with the Service about the management of game mammals, (2) the nature of the consultations, (3) DLNR's game management, (4) allowed hunting activity, (5) economic activity related to game hunting, (6) the value of game hunting to hunters, (7) the amount of Pittman-Robertson funding provided to the state for wildlife management projects (the amount is fixed by formula), or (8) wildlife management projects that are partially funded under the Pittman-Robertson Act.

State Parks, Recreation Area, and Campground

The proposed critical habitat encompasses remote portions of two state parks, most of a State Recreation Area (SRA), and a state campground. Of potential concern is that Unit 3 includes most of the improvements in the heavily used Keaiwa Heiau SRA, including the loop road, parking areas, campsites, picnic tables, showers and restrooms. However, the operation and maintenance of existing man-made facilities, including park facilities, would not be affected by the critical habitat designation. In effect, these facilities are unmapped holes that are located within the boundaries of a critical habitat unit, but these holes are not part of the unit. In the case of Keaiwa Heiau SRA, redrawing the boundary of Unit 3 to exclude the improved portions of the SRA would make this explicit and would preclude unnecessary section 7 consultation costs.

Also, state park programs and projects are likely to be funded entirely by the state. Under these funding circumstances, there is no *Federal nexus* and therefore no requirement for section 7 consultation with the Service for modifications and additions to park facilities.

The Harold L. Lyon Arboretum

Deep in Manoa Valley, proposed critical habitat Unit 5 overlaps a portion of Harold L. Lyon Arboretum, including most of the managed garden and unmanaged areas, but excluding the main structures and parking area.

The managed garden is considered by the Service to be an existing man-made feature that forms an unmapped hole within the boundaries of the critical habitat unit, but it is not part of the unit. As such, operation and maintenance would not be affected by critical habitat designation. Furthermore, an ongoing gradual expansion of the managed garden has no *Federal nexus*, so it would not be subject to section 7 consultation.

Redrawing the boundary of Unit 5 to exclude the managed garden, and possibly the area planned for expansion, would make the hole explicit and would preclude unnecessary section 7 consultation costs.

DLNR Nursery and Staging Area

In Unit 1, the former Nike Station located in the mountains above Dillingham Air Field is used by DLNR as a nursery and as a staging area for its forestry operations. Critical habitat designation would have little or no economic impact on nursery and staging-area operations because: (1) it is unlikely that there would be a *Federal nexus* for state-funded operations, and (2) the operation and maintenance of this man-made feature amounts to an unmapped hole in the critical habitat unit. Thus, section 7 consultations would probably not be necessary, regardless of whether or not Unit 1 is designated as critical habitat.

And even if a new project proposed for the area does have a *Federal nexus* and section 7 consultation is required, critical habitat designation would not trigger consultations or project modifications above and beyond what will already occur with the existing species listing because this area is in an *occupied* portion of the proposed critical habitat.

Satellite Tracking Facility

In Unit 1, the U.S. Air Force operates a satellite tracking station at Mt. Ka'ala, which is in a geographic area considered to be *occupied* by the 'elepaio. Operation and maintenance of this existing man-made facility would not be affected by critical habitat designation.

No known plans exist for expanding or adding to this facility. But if expansions or additions do occur at some time in the future, critical habitat designation would not cause consultations or project modifications above and beyond what will already occur with the existing species listings.

Communications Facilities

A number of communications facilities are located within the proposed critical habitat. However, the major concern is the communications complex at the southern end of Unit 2 on the ridgeline below Palehua. This area hosts the largest complex of communications towers on O'ahu, including facilities for a number of Federal agencies, state agencies, and private companies. Furthermore, more towers are planned.

Palehua is Oahu's premier site for communications because of its unique combination of attributes, including: (1) a favorable location that provides good coverage to most of the urban areas on O'ahu, major military bases, airspace surrounding Honolulu Airport, and surface water to the south and west of Oahu; (2) a favorable location that allows microwave signals to be beamed to relay stations on O'ahu to Kaua'i; (3) sufficient acreage to site a large number of towers far enough from one another to avoid signal interference; (4) low visual impact because of the remote location; (5) good road access; (6) access to the electrical power grid; and (7) safety issues.

All of these communications facilities have *Federal involvement*, either because they are Federal facilities or because a broadcasting permit is required from the Federal Communications Commission (FCC). However, the operation and maintenance of these existing man-made facilities would not be affected by the critical habitat designation. They are unmapped holes that are located within the boundaries of a critical habitat unit, but are not considered by the Service to be part of the unit. In the case of Palehua, redrawing the boundary to exclude existing improvements would make this explicit and would preclude unnecessary section 7 consultation costs.

Major modifications or additions to existing communications towers and appurtenant structures, or development of new ones, might be subject to section 7 consultation. However, given the small footprint of a communications tower and appurtenant structure(s), project modification to avoid adverse impacts on the 'elepaio critical habitat could range from no modification being necessary to moving the site of a project a short distance; the increase in cost could range from no increase to a modest amount.

However, there is a slight probability of a very large economic impact. This could occur if an important modification or addition to an existing communications facility is not made, or a new facility is not built at a proposed site or any other site, and this loss of development is directly attributable to the designation.

Power Transmission Lines

High-voltage power transmission lines traverse portions of the proposed critical habitat units. Since these are existing structures and the main activity associated with them is operations and maintenance, they will not be impacted by the proposed critical habitat designation.

No plans have been announced to install new power transmission lines across the Wai'anae Range or the Ko'olau Range within proposed O'ahu 'elepaio critical habitat. But if, at some time in the future, such projects are proposed through one or more of the proposed critical habitat units, they would not be subject to section 7 consultation as long as no Federal funds or permits are involved. And even if there is *Federal involvement* and section 7 consultation is required, project modification (if any) would likely be limited to re-siting support towers. The increase in cost could range from no increase to a modest amount. Power lines strung above tree level appear not to adversely affect 'elepaio, as evidenced by the fact that 'elepaio currently are found in areas traversed by transmission lines.

Farming and Ranching

The designation would have no impact on farming or ranching since none is known to take place in any of the units. Unit 5 does have about 184 acres located in the state Agricultural District, but this land is in a military base and is unsuitable for farming because of steep slopes.

Water Systems

Water improvements are located throughout the proposed critical habitat, and include gauging stations; wells; pumps; intake systems that divert water from streams; and pipelines and major irrigation ditches that deliver mountain water to water tanks and reservoirs. These improvements are components of water systems that deliver potable water to homes in many areas of Honolulu, and deliver irrigation water to major farm areas on O'ahu.

These water improvements require periodic maintenance to insure that pumps continue to run, leaks are detected and repaired, vegetation is cleared from ditch systems, etc. However, the operation and maintenance of these water improvements would not be subject to section 7 consultation with the Service for two reasons. First, it is funded entirely by the state, county, and/or a private organization, with no *Federal nexus* that would trigger consultation. Second, the water improvements are existing man-made features and, as such, their operation and maintenance would not be affected by the critical habitat designation.

New water improvements could be subject to section 7 consultation if there is *Federal involvement,* such as funding from the U.S. Department of Agriculture to share in the cost of rebuilding an irrigation ditch system, or Federal permits under the Clean Water Act for projects that affect streams (e.g., improving a diversion dam, or replacing a high-maintenance flume that crosses a stream with a pipe syphon that is anchored on each side of the stream). However, project modifications associated with rebuilding a portion of an existing water system are likely to be modest in view of the fact that water improvements exist in areas having high densities of 'elepaio.

While it is anticipated that portions of existing irrigation ditch systems will be rebuilt, it is unlikely that new ditch systems and major expansions to existing ones will be proposed or approved. The reason for this is that such improvements would directly or indirectly reduce stream flows, which would be a major environmental concern.

Trails, Roads and Helicopter Landing Areas

Access to the forest areas within the proposed critical habitat is by numerous hiking trails, four-wheel-drive trails, unpaved access roads, a few paved roads, and helicopter landing areas. Their maintenance would not be subject to section 7 consultation because they are existing man-made features. Also, access improvements having no *Federal involvement* would not be subject to consultation.

If there is *Federal involvement*, project modification (if any) to avoid adverse impacts on the 'elepaio or its habitat would likely be limited to making adjustments to a route or resiting an improvement; the increase in cost could range from no increase to a modest amount. If the improvement is in an area *occupied* by 'elepaio, designation would not cause consultations or project modifications above and beyond what will already occur due to the existing species listings.

Urban Development

Proposed critical habitat Unit 5 includes about 64 acres of urban land located in back of Wailupe Valley. The land is owned by the City and County of Honolulu, but there are no plans for the land. Also, the land is zoned General Preservation (P-2) which limits the development potential. Given its location, the size of the parcel, its topography and soil conditions (unstable), surrounding land uses, and development restrictions, realistic development options include: (1) leaving the land in its natural state, (2) outdoor recreation, and (3) agriculture (e.g., a nursery, a truck farm, community gardens, etc.).

If a project proceeds that has *no Federal nexus*, then no section 7 consultation would be required even if the land is designated as critical habitat On the other hand, if there is *Federal nexus*, then the project would be subject to consultation and possible project modification. But since the project would be located on a parcel that is *occupied* by 'elepaio, the critical habitat designation would not cause consultations or project modifications above and beyond what will already occur due to the existing species listing.

Military Activities

The proposed critical habitat overlaps seven areas that are under the control of the U.S. military. However, based on available information, the proposed critical habitat designation is likely to have, at most, a modest economic impact on military activities.

Four of the overlaps are in the Wai'anae Range in areas that have steep slopes and difficult access. Also, these areas are part of safety zones, including two for live-fire training and maneuver training which take place at lower elevations, and one for storage of munitions in the valley below. Noise studies have shown no adverse impacts on 'elepaio during live-fire training. Two of the four overlaps are also flyover areas for helicopters. No training activities occur within these four overlaps, and none are planned. Furthermore, no significant improvements are located in these areas, and none are scheduled.

Another two overlaps of critical habitat onto military areas are in the Ko'olau Range at the northern end of Unit 3. One area, used for helicopter training, would not be impacted by the designation. The other is used for live-fire and maneuver training, and some areas are used for safety zones or as flyover areas for helicopters.

Another overlap is a narrow mountain valley at the southern end of Unit 3. This valley is inland of all known military improvements, operations, and activities, and none are anticipated in the valley.

Anticipated changes arising from critical habitat designation would include: (1) expansion in the scope of section 7 consultations to consider impacts of military activities on 'elepaio habitat in areas that are not currently *occupied* by 'elepaio, and (2) possible expanded efforts at fire control. Assuming adequate fire control, the designation is likely to have little or no impact on live-fire and maneuver training, helicopter training, storage of munitions or any other military activities or operations. If the risk of fire cannot be controlled sufficiently, mitigation may be required, possibly including rodent control.

Residential Use

Only about a dozen homes are known to exist within the proposed critical habitat. However, residential use of a developed property would be regarded by the Service as oper-

ations and maintenance of an existing structure, which is an acceptable use within a critical habitat. Also, any improvements that are made within the confines of a residential lot would not *adversely modify* the habitat containing the *primary constituent elements* essential for the conservation of the species. Thus, neither the residential use of a home nor home improvements would be impacted by the proposed critical habitat designation.

Property Values

Private landowners have expressed concern that their property values may decrease if portions of their lands are designated critical habitat. The concern primarily involves land that is (1) located in the state's Urban, Rural or Agricultural Districts, and (2) suitable for eventual development or commercial use based on access, gentle slopes, proximity to infrastructure and services, etc.

However, no such private properties exist within the proposed critical habitat. All of the private lands are in mountainous areas having difficult access and terrain, and are within the State's Conservation District where land-use controls severely limit development and most other land uses. Thus, the proposed critical habitat designation would result in little or no loss of potential development or any other economic use that could affect private property values.

Ecotourism

If the proposed critical habitat designation contributes to an increase in 'elepaio populations and an expansion of the bird's range—as well as that of other birds that would benefit—this would contribute to Hawaii's visitor industry in two ways. First, hiking tours would be more rewarding because of increased sightings of 'elepaio and other birds. Second, with an expanded range, more trails could be hiked to view 'elepaio and other birds. With more opportunities to observe birds and more bird sightings, mountain hikes would be more attractive to bird watchers, and companies that market nature tours would be likely to offer more mountain hikes and would increase their marketing accordingly.

Economic studies have not been conducted on the potential increase in tourism that would result from an increase in the numbers and ranges of 'elepaio and other birds. However, the magnitude of the potential economic impact can be illustrated based on the assumption that a sufficient number of new and repeat visitors can be attracted to Hawai'i or enticed to extend their stays, such that they would increase the average visitor census by a modest 10 visitors. This translates into increased visitor expenditures of about $550,000 per year, an increase in gross state product of about $340,000 per year, an increase in household income of about $220,000 per year, and about 8.5 more jobs. Doubling the increase in the visitor census to 20 additional visitors would double the economic impacts, etc.

Recovery from Natural Disasters

In the event of a hurricane, earthquake, or other natural disaster, a consultation with the Service would be required if financial assistance is sought from the Federal Emergency Management Agency (FEMA) to help residents, businesses or government recover in areas where there are critical habitat. In such emergencies, the Service expedites consultations.

The most likely natural disaster to affect proposed critical habitat, and the one that would cause the most damage, would be a major hurricane passing over O'ahu. These are rare events: historically, O'ahu has never been hit by a hurricane, but five have passed sufficiently close to have caused damage.

In the mountainous regions proposed for critical habitat, wind and water damage caused by a major hurricane would include downed trees and branches; washed out roads, trails, and irrigation ditch systems; and damage to communications facilities and power transmission lines; etc. Recovering from a natural disaster would involve clearing away downed trees, branches, and other debris, and rebuilding damaged structures.

As long as the hurricane recovery projects are planned in such a way that they avoid further damage to forests—which is likely to be the case—the proposed 'elepaio critical habitat designation would have little or no economic impact on FEMA projects following a hurricane and, by similar logic, following other natural disasters.

Cost of Derivative Changes in Land Regulation and Land Management

A number of public and private landowners and land managers fear that critical habitat designations will, or could, result in derivative changes in land regulations and land management, and that these changes could be costly to them. The concern includes changes that may be regarded as reasonably foreseeable, and extends to ones that could be indirect, unintended and unforeseen.

The most common concern is that critical habitat designations represent a new and potentially expensive “layer” of land regulation imposed by the Service or, at the very least, would be the first step towards a new layer of land regulation. Emanating from this concern, a number of landowners and land managers foresee likely new restrictions on the use of their lands, additional costs and delays in obtaining project approvals, and more expenses associated with how they manage their lands. Furthermore, they anticipate that government agency funding will be inadequate for the agencies to manage their expanded responsibilities properly, including funding of partnership programs.

The concern has little or no basis in fact for about half of the proposed critical habitat, but does have limited factual basis for the other half. Even so, the Service is proposing critical habitat designation for the 'elepaio because it is mandated by law. Starting with the

area where the concern has essentially no basis in fact, about 21% of the proposed critical habitat is *occupied* by 'elepaio. For this portion of the proposed designation, Federal action agencies currently must consult with the Service about projects that have *Federal involvement* and are located in the vicinity of listed species. Furthermore, there should be little or no change in the scope of the consultations, and little or no change in the recommendations made by the Service. In short, the practical effect is that the critical habitat designation would not add a new layer of land regulation for the *occupied* portions of critical habitat units.

About 30% of the proposed critical habitat is *unoccupied* by 'elepaio, but is *occupied* by other listed species. For these areas, the proposed designation is not expected to increase the number of consultations with the Service but, with 'elepaio critical habitat designation, the scope of consultations would expand to consider whether the projects and activities would impact the *primary constituent elements* essential to the survival and recovery of the 'elepaio.

Finally, approximately half of the acreage proposed for critical habitat designation is *unoccupied* by 'elepaio, and no other listed species are known to be present. This acreage would become subject to a new layer of management by the Service.

The latter two cases would not amount to a significant change in land management, however. The number of affected consultations is expected to be small and project modifications modest because nearly all of this land is located in the Conservation District where land use, development, and most activities are severely restricted.

Benefits of Preserving O'ahu 'elepaio

The Service estimates that the potential population of 'elepaio in the areas proposed for critical habitat designation could reach a sustainable level of about 10,100 birds, compared to less than 1,800 breeding birds currently on O'ahu. The resulting distribution would closely resemble the distribution in 1975.

Many people would derive satisfaction simply from knowing that the endangered 'elepaio is being saved and that it will be on earth for future generations to appreciate. Related to the benefit of preserving the 'elepaio is the benefit of preserving and perpetuating the cultural and mythological aspects of a bird that has special importance in Hawai'i because of its prominence in Hawaiian mythology, folklore and legends. They were often the first birds to sing in the morning, and their songs were thought to warn the night spirits that their work must end because dawn was approaching. They were also considered the '*amakua* (guiding spirit) of the Hawaiian canoe-builder because they played a role in his efforts to select the perfect rot-free *koa* log for his canoe.

No known studies have focused on the economic value of preserving the O'ahu 'elepaio. However, studies that have been done on other endangered birds provide insight into the magnitude of the benefits of preservation. Based on these studies, a reasonable estimate of the average dollar amount that O'ahu households would be willing to pay to preserve the O'ahu 'elepaio is $15 per year. For all households on O'ahu, the amount would be about $4.3 million per year. This potential benefit would be attributable only partially to the proposed critical habitat designation. It also reflects the listing of the O'ahu 'elepaio as endangered, and land management to control threats to the 'elepaio (e.g., rodent control).

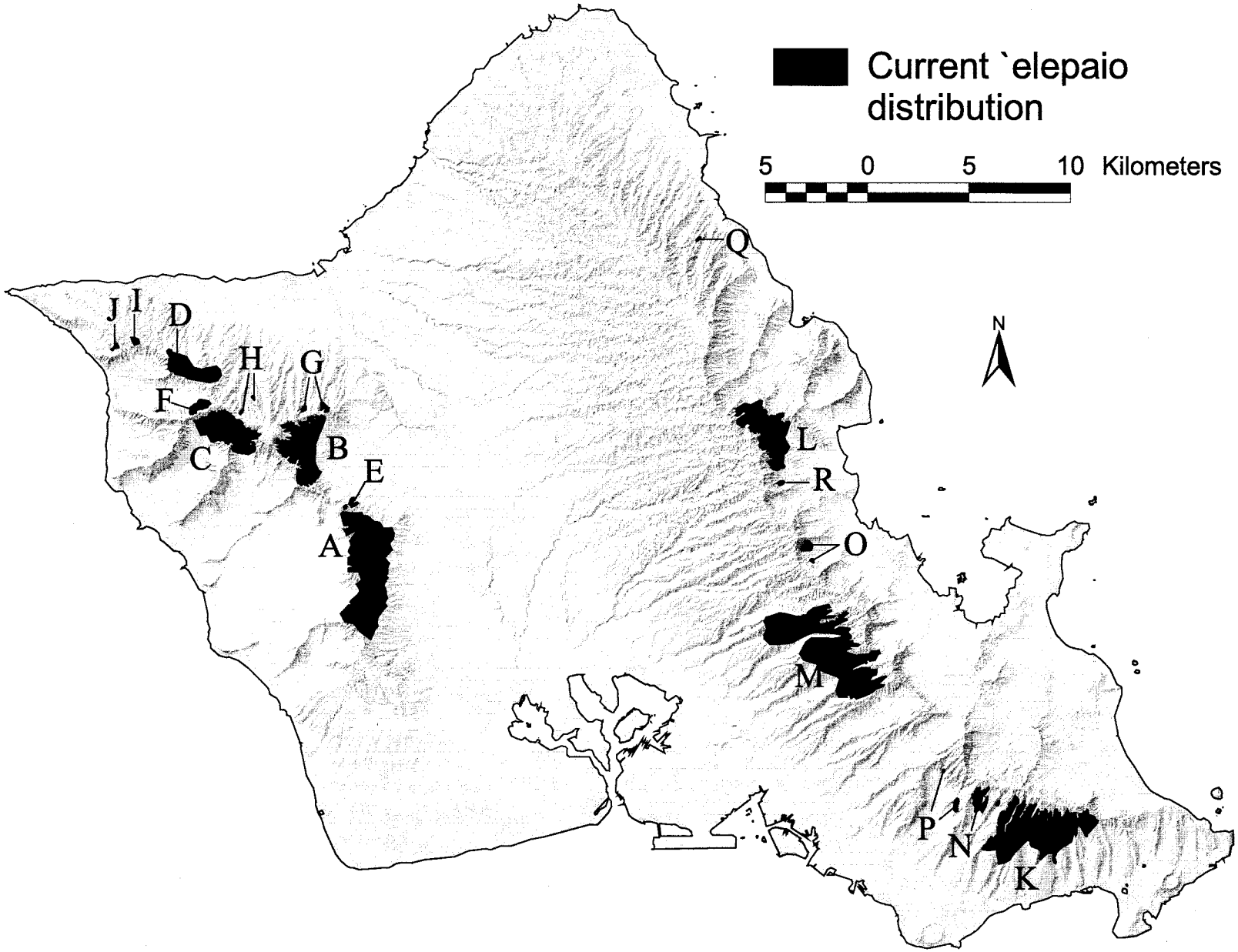

Figure ES.1 Current Range of the O'ahu 'Elepaio

Figure ES-2. Proposed Critical Habitat Units, O'ahu 'Elepaio

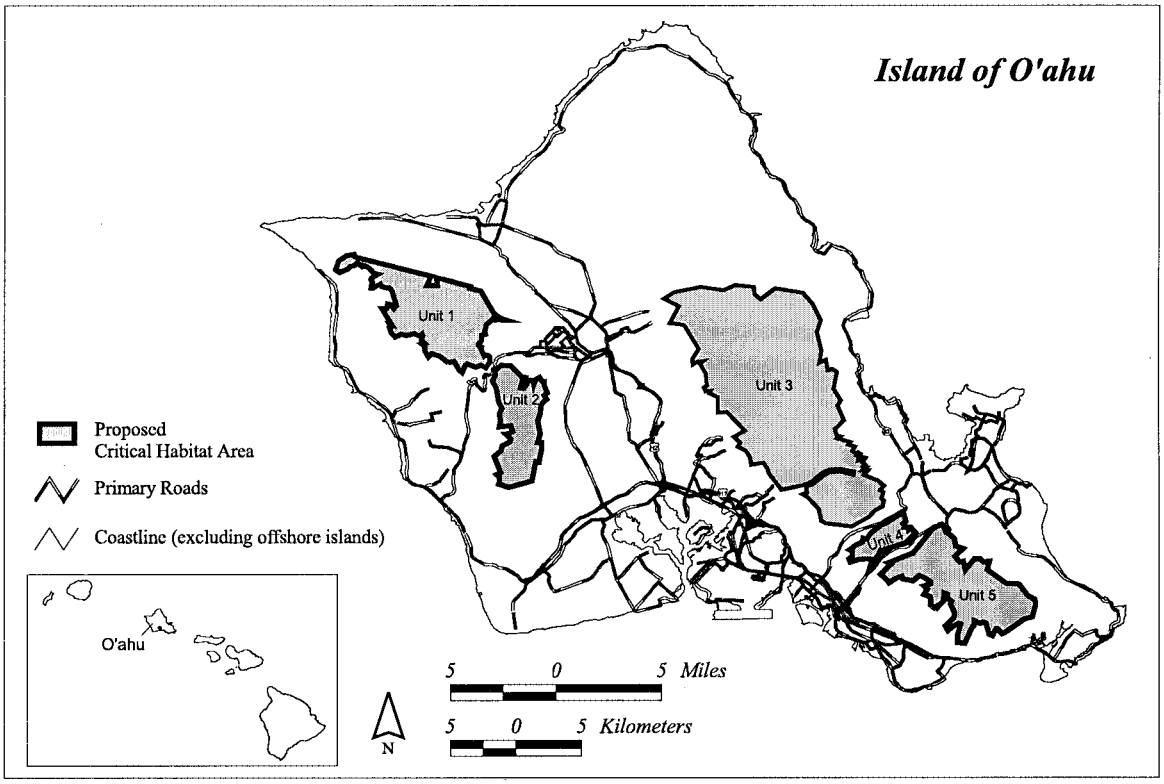

Table ES-1. Proposed Critical Habitat Units, O'ahu 'Elepaio: Acreage, Location, Ownership, Land Management, Improvements and Activities

(acres)

Item	All Units*				Unit 1*		
	Occupied	**Unoccupied**	**Total**		**Occupied**	**Unoccupied**	**Total**
Total Area*	14,027	52,327	66,354		3,315	7,807	11,122
Land Ownership							
Federal	2,083	8,525	10,608	16%	1,302	729	2,031
State	3,249	22,362	25,611	39%	1,085	6,355	7,440
County	1,349	2,698	4,047	6%	923	673	1,596
Private, Major Owner	7,337	18,498	25,835	39%	-	-	-
Private, Small Owners	-	25	25	0.0%	-	1	1
Federally Controlled or Managed							
Military	2,849	8,810	11,659	18%	1,609	1,276	2,884
National Wildlife Refuge	-	4,778	4,778	7%	-	-	-
State-Controlled or Managed, Conservation District	13,866	52,249	66,115	99.6%	3,316	7,804	11,119
Conservation District Subzones							
Protective	2,255	21,330	23,585	36%	864	4,345	5,209
Limited	976	641	1,618	2%	19	102	121
Resource	10,274	29,503	39,777	60%	2,432	3,249	5,681
General	361	774	1,136	2%	0	107	108
Forest Reserves	1,381	15,610	16,991	26%	365	4,473	4,839
Natural Area Reserves (NARs)	413	1,330	1,743	3%	413	1,330	1,743
Hunting Units	2,200	11,198	13,397	20%	778	5,087	5,865
State Parks	572	1,871	2,444	4%	1	4	5
County-Controlled or Managed							
Agricultural District	101	107	208	0.3%		4	4
Urban	64	5	69	0.1%	-	-	-
Board of Water Supply	1,332	2,655	3,987	6%	923	673	1,596
Other Management							
Watershed Partnership	7,336	40,560	47,896	72%	-	-	-
TNCH Preserve	1,739	1,866	3,605	5%	-	-	-
Improvements/Activities**							
Paved Roads	•	• (6)	• (6)		•	••	••
Unpaved Rds or 4-wd Trails	• (7)	• (17)	• (18)		••	••••	••••
Hiking Trails	• (21+)	• (49+)	• (51+)		• (6+)	• (9+)	• (9+)
Improved Parks/Camp Grounds		••	••			•	•
Aboretum		•	•				
Staging Area & Nursery		•	•			•	•
Satellite Tracking Facility		•	•			•	•
Communication Complexes		• (5)	• (5)			••	••
Power Transmission Lines	••••	• (5)	• (5)				
Water Improvements	• (8+)	• (28+)	• (35+)		•••	••••	• (7+)
Homes	•	• (10)	• (11)				
Hunting, State Lands	• (7)	• (11)	• (11)		••••	••••	••••
Military Training		••	••				
Safety Zone, Military Operations	••••	••••	••••		••	••	••

* Entries may not sum to totals due to rounding, slight acreage discrepancies, and overlapping land management areas.

** Multiple dots indicate multiple improvements/activities—one for each dot. With 5 or more items, the number is given in parentheses.

Table ES-1. Proposed Critical Habitat Units, O'ahu 'Elepaio: Acreage, Location, Ownership, Land Management, Improvements and Activities

(acres)

Item	Unit 2*			Unit 3*		
	Occupied	**Unoccupied**	**Total**	**Occupied**	**Unoccupied**	**Total**
Total Area*	2,999	3,216	6,215	4,815	31,854	36,669
Land Ownership						
Federal	781	742	1,523	-	7,048	7,048
State	479	454	933	705	9,228	9,933
County	-	-	-	80	682	762
Private, Major Owner	1,739	2,020	3,760	4,026	14,901	18,927
Private, Small Owners	-	-	-	-	-	-
Federally Controlled or Managed						
Military	1,240	757	1,998	-	6,777	6,777
National Wildlife Refuge	-	-	-	-	4,778	4,778
State-Controlled or Managed, Conservation District	2,899	3,134	6,032	4,819	31,856	36,674
Conservation District Subzones						
Protective	426	6	432	793	13,048	13,841
Limited	843	392	1,235	-	4	4
Resource	1,480	2,607	4,087	4,026	18,727	22,753
General	150	129	278	-	76	76
Forest Reserves	16	314	330	20	6,762	6,782
Natural Area Reserves (NARs)	-	-	-	-	-	-
Hunting Units	-	-	-	523	4,470	4,993
State Parks	-	-	-	571	1,868	2,438
County-Controlled or Managed						
Agricultural District	101	83	184	-	14	14
Urban	-	-	-	-	5	5
Board of Water Supply	-	-	-	80	682	762
Other Management						
Watershed Partnership	-	-	-	4,817	31,706	36,523
TNCH Preserve	1,739	1,866	3,605	-	-	-
Improvements/Activities**						
Paved Roads		•	•		•	•
Unpaved Rds or 4-wd Trails	•	•	•	•••	• (8)	• (8)
Hiking Trails	•••	•••	• (5+)	• (7+)	• (19+)	• (19+)
Improved Parks/Camp Grounds					•	•
Aboretum						
Staging Area & Nursery						
Satellite Tracking Facility						
Communication Complexes		•	•			
Power Transmission Lines				•	••	••
Water Improvements				• (5+)	• (14+)	• (18+)
Homes		• (6)	• (6)	•	••••	• (5)
Hunting, State Lands				•	•••	•••
Military Training					••	••
Safety Zone, Military Operations	••	••	••			

* Entries may not sum to totals due to rounding, slight acreage discrepancies, and overlapping land-management areas.

** Multiple dots indicate multiple improvements/activities—one for each dot. With 5 or more items, the number is given in parentheses.

Table ES-1. Proposed Critical Habitat Units, O'ahu 'Elepaio: Acreage, Location, Ownership, Land Management, Improvements and Activities

(acres)

Item	Unit 4*			Unit 5*		
	Occupied	**Unoccupied**	**Total**	**Occupied**	**Unoccupied**	**Total**
Total Area*	-	1,977	1,977	2,898	7,473	10,371
Land Ownership						
Federal	-	-	-	-	7	7
State	-	971	971	980	5,354	6,334
County	-	443	443	346	901	1,247
Private, Major Owner	-	541	541	1,572	1,036	2,607
Private, Small Owners	-	23	23	-	-	-
Federally Controlled or Managed						
Military	-	-	-	-	-	-
National Wildlife Refuge	-	-	-	-	-	-
State-Controlled or Managed, Conservation District	-	1,988	1,988	2,834	7,468	10,302
Conservation District Subzones						
Protective	-	1,024	1,024	173	2,907	3,079
Limited	-	-	-	114	144	258
Resource	-	964	964	2,336	3,956	6,292
General	-	-	-	211	462	673
Forest Reserves	-	971	971	980	3,090	4,070
Natural Area Reserves (NARs)	-	-	-	-	-	-
Hunting Units	-	520	520	899	1,121	2,020
State Parks	-	-	-	-	-	-
County-Controlled or Managed						
Agricultural District	-	-	-	-	6	6
Urban	-	-	-	64	-	64
Board of Water Supply	-	443	443	330	858	1,247
Other Management						
Watershed Partnership	-	1,976	1,976	2,519	6,877	9,397
TNCH Preserve	-	-	-	-	-	-
Improvements/Activities**						
Paved Roads					••	••
Unpaved Rds or 4-wd Trails				•	••••	• (5)
Hiking Trails				• (5+)	• (18+)	• (18+)
Improved Parks/Camp Grounds						
Aboretum					•	•
Staging Area & Nursery						
Satellite Tracking Facility						
Communication Complexes					••	••
Power Transmission Lines				•••	•••	•••
Water Improvements		••	••		• (8+)	• (8+)
Homes						
Hunting, State Lands		•	•	••	•••	•••
Military Training						
Safety Zone, Military Operations						

* Entries may not sum to totals due to rounding, slight acreage discrepancies, and overlapping land-management areas.

** Multiple dots indicate multiple improvements/activities—one for each dot. With 5 or more items, the number is given in parentheses.

O'AHU 'ELEPAIO AND PROPOSED CRITICAL HABITAT

SECTION 1

INTRODUCTION

Under the Endangered Species Act of 1973 (ESA), as amended, the Department of the Interior, Fish and Wildlife Service (the Service) proposes to designate five critical habitat units for the endangered O'ahu 'elepaio on the island of O'ahu in Hawaii. This section provides information on (1) the endangered O'ahu 'elepaio ('elepaio) for which the critical habitat units are being proposed, (2) background information on the listing of the 'elepaio as an endangered species, (3) the proposed critical habitat units, and (4) potential recovery of the 'elepaio.

Most of the information on the 'elepaio and on the proposed critical habitat units presented below and in subsequent chapters comes from the document "Endangered and Threatened Wildlife and Plants; Proposed Determination of Critical Habitat for the O'ahu 'Elepaio," (the proposed rule), published in the *Federal Register* on June 6, 2001. In addition, the Service provided resource maps and acreage data for the units.

O'AHU 'ELEPAIO

The O'ahu 'elepaio (*Chasiempis sandwichensis ibidis*) is a small forest-dwelling bird (0.43 ounce average weight and 6 inches total body length), and is a member of the monarch flycatcher family Monarchidae. 'Elepaio occur in a variety of forest types, but are most common in riparian vegetation along streambeds and in mesic forest having a tall canopy and a well-developed understory. Population density is roughly 50% lower in shorter dry forest on ridges. 'Elepaio are not currently found in very wet, stunted forest on windswept summits or in very dry shrub land, but these areas may be used by individuals that are dispersing among populations. Forest structure appears to be more important to 'elepaio than is plant-species composition and, unlike many Hawaiian forest birds, 'elepaio have adapted well to disturbed forest composed of introduced plants.

The current O'ahu 'elepaio population is approximately 1,982 birds distributed in six core subpopulations and several smaller subpopulations. The number of birds is divided about evenly between the Wai'anae Range in the west and the Ko'olau Range in the east, with three core subpopulations in each mountain range (see Figure ES-1). At least ten tiny remnant subpopulations consisting mostly or entirely of males remain in both the Wai'anae and Ko'olau ranges. In the past, these subpopulations were much larger or continuous with other subpopulations, but because of their very small size, skewed sex ratio, and geographic isolation, these relicts are likely to disappear in a few years as the last adults die. The breeding population—about 1,774 birds—is less than the total population because of a male-biased sex ratio; in the large populations, only 84% of territorial males have mates, and many small and declining populations contain mostly males. The effective population size is probably even smaller than the breeding population because of the geographically fragmented distribution.

Referring to Figure ES-1, the largest subpopulations and densities in the Wai'anae Range are: subpopulation A, southern Wai'anae Mountains (418 breeding birds at an average density of 14.5 birds per 100 acres); subpopulation B, Schofield Barracks West Range (310 birds at 23.6 birds per 100 acres); and subpopulation C, Makaha and Wai'anae Kai Valleys (112 birds at 9.9 birds per 100 acres). In the Ko'olau Range, the largest subpopulations and densities are: subpopulation K, southern Ko'olau (432 birds at 16.4 birds per 100 acres); subpopulation L, Waikane and Kahana Valleys (242 birds at 18.7 birds per 100 acres); subpopulation M, central Ko'olau (206 birds at 6 per 100 acres); and subpopulation N, Palolo Valley (42 birds at 21.8 birds per 100 acres).

Before humans arrived, forest covered about 313,690 acres on O'ahu, and it is likely that 'elepaio once inhabited much of that area. Reports by early naturalists indicate that 'elepaio were once widespread and abundant on O'ahu.

Despite its adaptability, the O'ahu 'elepaio has seriously declined since the arrival of humans, and it has disappeared from many areas where it was formerly common. The aggregate geographic area of all current subpopulations is approximately 14,000 acres. Thus it currently occupies only about 4% of its original prehistoric range, and its range has declined by roughly 96% since humans arrived in Hawai'i some 1,600 years ago. In 1975, 'elepaio inhabited approximately 51,620 acres on O'ahu—almost four times the area of the current range. Thus the bird's range has declined by nearly 75% over the past 25 years.

Much of the historical decline of the O'ahu 'elepaio can be attributed to habitat loss, particularly at low elevations. About 55% of the original prehistoric range has been developed for urban or agricultural use, and practically no 'elepaio remain in developed areas.

However, many areas of O'ahu that recently supported 'elepaio and still contain apparently suitable forest habitat are currently *unoccupied,* demonstrating that habitat loss is not the only threat. Recent declines in 'elepaio populations are due to a combination of low adult survival and low reproductive success. The main cause of reduced adult survival on O'ahu appears to be diseases, particularly avian pox and avian malaria which are carried by the introduced southern house mosquito. The primary reason for low reproductive success is nest predation by the introduced black rat; the reproductive success of 'elepaio is also affected by disease.

Although the 'elepaio has declined island-wide and its range has contracted considerably, density in the remaining core subpopulations is high, and much of the currently *occupied* land is at or near carrying capacity and cannot support many more 'elepaio than it currently supports. Consequently, each of the currently *occupied* areas is too small to support an 'elepaio population large enough to be considered safe from extinction. In order for the number of birds in each subpopulation to increase and for the species ultimately to be removed from the endangered species list, additional land must be available for young birds to establish new territories and attract mates.

LISTING OF THE O'AHU 'ELEPAIO AS ENDANGERED

The Service published the proposed rule to list the O'ahu 'elepaio as an endangered species in the *Federal Register* in October 1998, and published the final rule in April 2000. When the proposed rule was published, the Service considered critical habitat designation and determined that it was not prudent to do so because they believed it would not provide any additional benefit beyond that provided through the listing itself. However, based partly on comments the Service received on the proposed listing rule and on recent court rulings that address the prudency standard, the Service determined in the final listing rule that critical habitat designation was prudent because such a designation could (1) extend protection to currently *unoccupied* habitat, and (2) provide informational and educational benefits. The Service also indicated in the final listing rule that it was unable to develop a proposed critical habitat designation at that time due to budgetary and workload constraints.

However, on June 28, 2000, the U.S. District Court for the District of Hawaii established, in the court case Conservation Council for Hawaii v. Babbitt, a timetable to designate critical habitat for the O'ahu 'elepaio, and ordered that the Service publish a final critical habitat designation by October 31, 2001.

PROPOSED CRITICAL HABITAT UNITS

As shown in Figure ES-2, the Service proposes five units for designation as critical habitats, all of which are located in the mountains at the higher elevations:

— Unit 1: Northern Wai'anae Mountains (11,122 acres)

Unit 1 is bounded on the south by Kolekole Pass, and on the north, east, and west by forest edge. Natural features within the unit include: (1) Mt. Ka'ala, the highest peak on O'ahu at 4,025 feet; (2) several other high peaks along the spine of the Wai'anae Range; (3) the upper portions of large, broad valleys on the west slopes of the Wai'anae Range; (4) the upper portions of large gulches on the east slope; and (5) the higher portions of several narrow valleys on the north slope of the Wai'anae Range.

The unit also includes: (1) all of the Pahole and Ka'ala State Natural Area Reserves; (2) all or major portions of the Mokule'ia, Wai'anae Kai, and Kuaokala State Forest Reserves, (3) the Army Schofield Barracks West Range above the firebreak road; (4) the upper valley rim of the U.S. Army Makua Military Reservation; and (5) watershed land managed by the Board of Water Supply, City and County of Honolulu (the county).

— Unit 2: Southern Wai'anae Mountains (6,215 acres)

Unit 2 is bounded on the north by Kolekole Pass, and on the east, west, and south by forest edge. Natural features of the unit include: (1) several high peaks along the spine of the southern Wai'anae Range; (2) the upper portions of two large, broad valleys on the west side of the mountains; and (3) the upper portions of numerous narrower valleys on the east side of the mountains.

The unit also includes: (1) all of the Honouliuli Preserve, (2) a portion of the Nanakuli State Forest Reserve, (3) a portion of the U.S. Army Schofield Barracks South Range, and (4) the upper valley rim of the Naval Magazine Pearl Harbor, Lualualei Branch.

— Unit 3: Central Ko'olau Mountains (36,669 acres)

Natural features of Unit 3 include the summit of the Ko'olau Range and the upper portions of numerous narrow valleys separated by steep ridges. The unit also includes: (1) a portion of the Kawailoa Training Area**,** (2) a portion of the U.S. Army Schofield Barracks East Range, (3) mountainous portions of the U.S. Army Fort Shafter, (4) the O'ahu Forest National Wildlife Refuge, (5) the Waiahole and 'Ewa Forest Reserves, (6) a portion of the state's Honolulu Watershed Forest Reserve, (7) the mountainous portion of Kahana Valley State Park, and (8) nearly all of Keaiwa Heiau State Recreation Area. The long, narrow indentation in the southern portion of Unit 3 reflects the H-3 freeway and adjacent cleared areas in North Halawa Valley.

— Unit 4: Kalihi-Kapalama (1,977 acres)

Unit 4 encompasses the leeward (western) side of the central Ko'olau Mountains above Kalihi and Kapalama. It is bounded on the north by the Likelike Highway and on the south by the Pali Highway. Natural features of the unit include the upper portions of three major valleys. This unit includes portions of the state Honolulu Watershed Forest Reserve and also watershed land managed by the county Board of Water Supply.

— Unit 5: Southern Ko'olau Mountains (10,371 acres)

Natural features of Unit 5 include: (1) the summit of the southern Ko'olau Mountains, including Konahuanui, the highest peak in the Ko'olau Range at 3,150 feet; (2) the upper portion of Maunawili Valley on the windward (northern) side of the mountains; and (3) the upper portions of numerous narrow valleys separated by steep ridges on the leeward side. This unit includes portions of the state Honolulu Watershed Forest Reserve and also watershed land managed by the county Board of Water Supply.

The proposed rule contains a more detailed description of each of the proposed critical habitat units, including more information on natural features, vegetation types, information on 'elepaio populations, land ownership, the critical habitat boundaries and the map coordinates of boundary points. In this report, Table ES-1 provides some of the same information, including the unit acreages, whether the acreage is *occupied* or *unoccupied*, managed areas, who owns the land, and improvements and activities within the units.

As explained in the proposed rule, the critical habitat units contain the diversity of forested ecosystems that are inhabited by 'elepaio: wet, mesic, and dry forests having tall canopies and well-developed understories, at both high and low elevations and composed of native and introduced species. These forested ecosystems contain the *primary constituent elements* for 'elepaio, elements that are essential for the primary biological needs of foraging, nesting, rearing of young, intra-specific communication, roosting, dispersal, genetic exchange, or sheltering. In addition, the proposed designation includes wet or dry shrubland and cliff habitat that are used transiently by 'elepaio for dispersal.

As shown in Table ES-1, the five proposed critical habit units encompass a total of 66,354 acres, comprising approximately 17% of the island. The Federal government owns about 10,610 acres (about 16% of the proposed critical habitat acreage), the state owns about 25,610 acres (about 39%), and the county owns about 4,050 acres (about 6%). Because of changes in landownership, these figures differ from those given in the proposed rule (see the Preface).

About 14,030 acres (about 21%) of the lands proposed for critical habitat designation represents the current estimate of the range of the 'elepaio; that is, the *occupied* lands. All of the remaining 52,330 acres (about 79%) of *unoccupied* lands proposed for critical habitat designation were *occupied* by the 'elepaio in 1975. These areas that are now *unoccupied* are included in the proposed designation because they would provide sufficient land to support a population of 'elepaio large enough to be considered safe from extinction. Over time, the acreage figures for the *occupied* and *unoccupied* portions of each unit may change in equal and opposite directions, with an increase in *occupied* acreage occurring at the expense of *unoccupied* acreage, and vice-versa; the direction of change will depend primarily on whether the 'elepaio population increases or declines.

In deciding which *unoccupied* areas to propose for designation, the Service gave preference to lands that (1) contain the forest types that are regarded as most preferred by 'elepaio, (2) were recently *occupied* (since 1975), and (3) are contiguous and form large blocks of preferred habitat or provide links between areas of preferred habitat. Unit 4, which is in the higher elevations of the central Ko'olau Range, is not known to contain any 'elepaio at present but would provide an important habitat "stepping-stone" that would increase the chances of dispersal and genetic exchange between 'elepaio subpopulations in neighboring Units 3 and 5.

The Service determined the boundaries of proposed critical habitat units by the extent of suitable forest containing the *primary constituent elements* for the 'elepaio, which in many areas coincided with the boundaries of state Forest Reserves, Natural Area Reserves, or other conservation lands. With few exceptions, the Service did not include urban and agricultural lands because they generally do not contain the *primary constituent elements* and do not meet the definition of critical habitat. Exceptions are discussed in Sections 5 and 7.

Finally, the Service was unable to map the proposed critical habitat unit boundaries in sufficient detail to exclude all existing developed lands that do not contain the *primary constituent elements*. However, existing development features and structures within the boundaries of the mapped units, such as buildings, roads, aqueducts, antennas, water tanks, agricultural fields, paved areas, lawns, and other urban landscaped areas that do not contain the *primary constituent elements* are not proposed as critical habitat.

POTENTIAL RECOVERY

If 'elepaio were restored throughout each of the proposed critical habitat units, the resulting distribution would closely resemble the distribution in 1975 when the subpopulations were larger and less isolated, the overall population appeared to be viable, and the

O'ahu 'elepaio was not considered to be endangered. The area proposed for critical habitat designation (66,354 acres) is larger than the area *occupied* in 1975 (51,620 acres) because the proposed critical habitat units contain not only lands that are expected to support breeding 'elepaio populations, but also intervening lands that provide for periodic dispersal and not permanent occupation.

The Service estimates the potential 'elepaio population in the area proposed as critical habitat at about 10,100 birds. This is based on multiplying the current density of 'elepaio in different parts of the island by the area of each critical habitat unit.

THE ENDANGERED SPECIES ACT SECTION 2

This section provides relevant information from the ESA, including the role of the economic analysis in designating a critical habitat, the role of critical habitat designations in protecting threatened and endangered species, requirements for consulting with the Service to insure that certain actions do not endanger listed species or their habitats, and *taking* restrictions that apply to wildlife**.**

ROLE OF THE ECONOMIC IMPACT ANALYSIS IN DESIGNATION OF CRITICAL HABITAT

Under section 4(b)(1) of the 1973 Endangered Species Act (ESA), the decision to list a species as endangered or threatened is made solely on the basis of scientific data and analysis. By contrast, under section 4(b)(2) of the ESA, the decision to designate a particular area as critical habitat must take into account the potential economic impact of the critical habitat designation. Specifically, the Service is required to make its decision concerning critical habitat designation on the basis of the best scientific and commercial data available, in addition to considering economic and other relevant impacts of specifying any particular area as critical habitat for a listed species. The Service may exclude an area from critical habitat designation if it determines that the benefits of excluding the area outweigh the benefits of including it unless it determines, based on the best scientific and commercial data available, that this will result in the extinction of the species.

Accordingly, the focus of the analysis in this report is on how the proposed critical habitat designation for the O'ahu 'elepaio may affect current and planned land uses, and the resulting economic costs and benefits.

ROLE OF CRITICAL HABITAT DESIGNATIONS IN PROTECTING THREATENED AND ENDANGERED SPECIES

For all the species that are listed as threatened or endangered, section 4(b)(2) of the ESA requires the Service to consider critical habitat designation. A critical habitat is a specific geographic area that is determined by the Service to be essential for the conservation of a threatened or endangered species and which may require special management and protection. Critical habitat designation can help focus conservation activities for a listed species by identifying areas that are essential to its conservation, and by heightening the awareness of Federal land management agencies and the public about the importance of the particular species and its critical habitat.

In addition to its informational role, the critical habitat designation may provide protection where significant threats have been identified. This protection derives from ESA section 7, which requires Federal agencies to consult with the Service in order to ensure that activities they fund, authorize, or carry out (i.e., the activities having *Federal involvement*) are not likely to destroy or *adversely modify* the critical habitat. The ESA regulations define *adverse modification* as any direct or indirect alteration that appreciably diminishes the value of the critical habitat for both the survival and recovery of the species.

But even without the critical habitat designation, the listing of species as threatened or endangered requires Federal agencies to consult with the Service in order to ensure that activities they fund, authorize, or carry out are not likely to *jeopardize* the continued existence of the *species*. The ESA regulations define *jeopardy* as any action that would appreciably reduce the likelihood of both the survival and recovery of the species.

The designation of critical habitat may include lands that are both *occupied* and *unoccupied* by the species. For geographic areas that are *occupied* by the species, the ESA defines *occupied* critical habitat as areas that contain the physical or biological features that are essential to the conservation of the species and that may require special management considerations or protection.

Unoccupied critical habitat includes those areas which fall outside the geographical area *occupied* by the species, but that may meet the definition of critical habitat upon determination that they are essential for the conservation of the species—that is, they will be needed for its recovery or to stabilize the population. *Unoccupied* lands proposed as critical habitat frequently include areas that were once inhabited by the species in question, which is the case for the O'ahu 'elepaio.

Federal agencies will have to consult with the Service regarding any activities they fund, authorize, or carry out that may *adversely modify* critical habitat, regardless of whether the habitat is *occupied* or *unoccupied.* But if the habitat is *occupied* by a listed species, then consultation is already required to ensure that activities are not likely to

jeopardize the continued existence of the species. Thus, the primary effect of a critical habitat designation is that it requires consultations with the Service for activities in areas that are *unoccupied*.

As mentioned in Section 1, approximately 21% of the proposed critical habitat for the O'ahu 'elepaio is *occupied* and 79% is *unoccupied*. However, much of the land that is *unoccupied* by the 'elepaio is *occupied* by other species that are listed as threatened or endangered. Thus, these lands would be subject to consultation requirements even without designation of critical habitat for 'elepaio.

CONSULTATION UNDER SECTION 7 OF THE ESA

As indicated above, section 7 of the ESA requires Federal agencies to consult with the Service whenever activities they fund, authorize, or carry out may affect listed species or designated critical habitat. Section 7 consultation with the Service is designed to ensure that current or future Federal actions do not appreciably diminish the value of critical habitat for the survival and recovery of a listed species.

Federal agencies are required to consult with the Service on land owned by individuals, organizations, states, or local and tribal governments only if the activities on the land have a *Federal nexus;* that is, if the activities (1) require a Federal permit, license, or other authorization, or (2) involve Federal funding. Section 7 consultation is not required for activities occurring on non-Federal lands when the activities are not Federally funded, authorized, or carried out. Nor is a consultation required for activities that do not affect listed species or their critical habitat.

When consultations concern activities on Federal lands, the relevant Federal agency initiates consultation with the Service. When an activity proposed by a state or local government or private entity requires a Federal permit or is Federally funded or carried out, the Federal agency with the nexus to the activity initiates consultation with the Service. For example, the Army Corps of Engineers is the agency that issues section 404 permits under the Clean Water Act, so it is the "action agency."

The consultation begins after the Federal action agency determines that its action may affect one or more listed species or their critical habitat, even if the effects are expected to be beneficial since projects with overall beneficial effects could include some adverse impacts. Consultations are frequently conducted for multiple species if more than one is affected by the action.

The consultation between the action agency and the Service may involve informal consultation, formal consultation in case of adverse impacts, or both. Informal consultation may be initiated via a telephone call or letter from the action agency, or a meeting between

the action agency and the Service. In preparing for an informal consultation, the action agency compiles all the biological, technical, and legal information necessary to analyze the scope of the activity and discusses strategies to eliminate adverse effects on listed species or critical habitat. Through informal discussions, the Service assists the action agency and the applicant, if any, in identifying and resolving potential conflicts at an early stage in the planning process, and may make recommendations, if appropriate, on ways to avoid adverse effects.

If during informal consultation the Federal agency determines that its action (as originally proposed or revised and taking into account direct and indirect effects) "is not likely to adversely affect" listed species or critical habitat (e.g., the effects are beneficial, insignificant or discountable), and the Service agrees with that determination, the Service provides concurrence in writing and no further consultation is required.

But if the proposed action, as revised during informal consultation, is still likely to adversely affect listed species or critical habitat then, for the activity to proceed, the action agency must request in writing initiation of formal consultation with the Service and submit a complete initiation package. Formal consultations, which are subject to specific timeframes, are conducted to determine whether a proposed action is likely to *jeopardize* the continued existence of a listed species or destroy or *adversely modify* designated critical habitat. This determination depends on a number of variables, including the type of project and its size, location and duration.

If the Service finds, in its biological opinion, that a proposed action is <u>not</u> likely to *jeopardize* the continued existence of a listed species, or destroy or *adversely modify* the critical habitat—even though the action may adversely affect listed species or critical habitat—then the action can be carried out without violating the ESA.

On the other hand, if the Service finds that a proposed action is likely to *jeopardize* the continued existence of a listed species and/or destroy or *adversely modify* the critical habitat, then the Service (1) notifies the Federal agency that the action will violate the ESA, and (2) provides the action agency with reasonable and prudent alternatives that will keep the action below the thresholds of *jeopardy* and/or *adverse modification.*

The Service is committed to working closely with action agencies and applicants in developing reasonable and prudent alternatives. A reasonable and prudent alternative is one that (1) can be implemented in a manner consistent with the intended purpose of the action; (2) can be implemented consistent with the scope of the action agency's legal authority and jurisdiction; and (3) is economically and technologically feasible. The Service will, in most cases, defer to the action agency's expertise and judgment as to the feasibility of an alternative. Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of a project. Costs associated with implementing reasonable and prudent alternatives vary accordingly.

In conjunction with the biological opinion, the Service also may issue an incidental-*take* statement for the action agency. This statement recognizes officially that although the action will not jeopardize the species as a whole, a few individuals of the species may be accidentally *taken* (see below) during the course of the action. Although the incidental-*take* statement exempts the action agency from liability for such accidents, the agency nevertheless must reinitiate consultation and reconsider its conservation measures if more than the expected number of fish or wildlife are *taken* or if the nature of the impacts changes. The incidental-*take* allowances, authorized under section 7(b), act as a compromise, allowing carefully planned projects to go forward with appropriate conservation measures.

TAKING RESTRICTIONS

Regardless of any *Federal nexu*s and critical habitat designation, once a species has been formally listed as threatened or endangered, it is entitled to certain regulatory protections under the ESA. First and foremost, section 9 of the ESA specifically prohibits the *taking* of any endangered species of fish or wildlife (the prohibition does not extend to plants). The term *take* is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." In addition, endangered species, their parts or any products made from them may not be imported, exported, possessed or sold. Section 4(d) of the ESA gives the Service regulatory discretion to extend the protections of section 9 to threatened species. While clearly prohibiting direct injury to individuals of a listed species, the restrictions on *takings* also apply to actions that destroy or alter the habitat of a listed species.

However, the ESA allows a private applicant to commit a *take* that would otherwise be prohibited if such *taking* was "incidental to, and not [for] the purpose of, the carrying out of an otherwise lawful activity." Under section 10 of the ESA, incidental *take* is currently authorized under a variety of voluntary agreements to conserve or minimize and mitigate impacts on fish and wildlife, including: (1) Candidate Conservation Agreements, (2) Safe Harbor Agreements, and (3) Habitat Conservation Plans with Implementation Agreements. Each of these voluntary agreements also requires a Federal permit: the first two agreements require an “enhancement of survival” permit, while the third agreement requires an “incidental-*take”* permit. Because of this *Federal nexus*, each agreement must satisfy the section 7 consultation requirement that the accompanying permit does not *jeopardize* a listed species or destroy or alter the habitat of a listed species, when such actions result in *take* of the species, as defined above.

EXISTING PROTECTIONS SECTION 3

This section presents information on existing regulations and land management policies that protect listed wildlife species or their habitats. Topics covered include: Federal and state protections for listed species, state and county land-use controls affecting public and private lands, and land management by various public and private organizations. Special attention is given to permitted and restricted activities that may affect threatened and endangered species in the proposed critical habitat units. Also, Table ES-1 provides the number of acres of *occupied* and *unoccupied* land within each unit that is subject to each type of land management. The information is used in defining a "baseline scenario," which assumes no critical habitat designation. In Section 7 of this report, the economic impacts attributable to critical habitat designation are based on deviations from this baseline scenario.

FEDERAL SPECIES PROTECTIONS AND LAND MANAGEMENT

Federal Protection of Threatened and Endangered Species

At the Federal level, the most significant existing protection of threatened and endangered species derives from their being listed by the Service as threatened or endangered (see Section 2). When species are listed, Federal agencies are required to consult with the Service to ensure that activities they fund, authorize, or carry out are not likely to *jeopardize* the continued existence of the species. Consultation is required with the Service, whether or not critical habitat are designated for the species. Also, the ESA prohibits the *taking* any threatened or endangered wildlife species (except for approved incidental *takings*), including *takings* that could result from the destruction or alteration of the habitat of the species. The protection of wildlife due to their listings supersedes all other Federal protections.

As mentioned in Section 1, about 14,030 acres (about 21%) of the lands proposed for designation represent the estimate of the current range of the 'elepaio. Assuming a project

having *Federal involvement*, this area is already subject to consultation because of the presence of the 'elepaio and its listing as an endangered species. Taking into account lands skirting the border of the 'elepaio's range, the amount of land that could be subject to consultation would be slightly larger than the range. This is because of the possibility that a project that is close to, but outside, the range of the 'elepaio could have an adverse impact on 'elepaio in a nearby *occupied* area, and this would trigger requirements under the ESA.

In addition, much of the *unoccupied* portions of proposed critical habitat units would still be subject to section 7 consultation because they contain listed species other than 'elepaio. Taking into account both the 'elepaio and these other listed species, about half the acreage of the proposed critical habitat units is *occupied* and would be subject to consultation even with no critical habitat designation for the 'elepaio (estimated by Decision Analysts Hawai'i, Inc.).

O'ahu Forest National Wildlife Refuge

The O'ahu Forest National Wildlife Refuge (O'ahu Forest NWR), established in December 2000, covers about 7 square miles in the northern Ko'olau Mountains. Purchased by the Service from a major landowner in Hawai'i, the O'ahu Forest NWR provides habitat for the 'elepaio and for other native-Hawaiian forest birds, many native plants (17 of which are endangered species), and four species of endangered O'ahu tree snails. Other native wildlife include at least two species of Hawaiian honeycreeper and a diverse array of native plants, insects, snails and stream fish. At least nine native natural communities have been identified in the O'ahu Forest NWR.

Because the O'ahu Forest NWR was created only recently, it is not yet being managed to meet all the recovery needs of the 'elepaio. Although preliminary biological surveys of the area have been conducted over the past 15 years, it has not been surveyed adequately to determine if 'elepaio are present.

Integrated Natural Resources Management Plans

The Sikes Act Improvements Act (SAIA) of 1997 requires every military installation containing land and water suitable for the conservation and management of natural resources to complete, by November 17, 2001, an Integrated Natural Resources Management Plan (INRMP). The purpose of the INRMP is to integrate the mission of the military installation with stewardship of the natural resources found there. Each INRMP includes an assessment of the ecological needs on the military installation, and each military installation having listed species consults with the Service on its INRMP.

Seven areas on O'ahu under the control of the military overlap with the proposed critical habitat of the 'elepaio, but as of June 2001 when the proposed rule was published, none of the affected military installations had completed INRMPs that provided sufficient management and protection for the 'elepaio. Therefore, portions of these military installations are included in the proposed critical habitat designation.

Conservation Partnerships Program, Pacific Islands Ecoregion

The Service's Conservation Partnerships Program is a collection of voluntary habitat restoration programs having the goal of restoring native Pacific Island ecosystems through collaborative projects with private landowners, community groups, conservation organizations, and other government agencies. The Program can provide cost-share funds, as well as information on habitat restoration techniques, native species, Safe Harbor Agreements, additional funding sources, required permits, and potential vendors of restoration services (fence contractors, nurseries, etc.). The Program is divided into five sections, discussed below, the first of which is currently being used to support a project located in a proposed critical habitat for the 'elepaio.

Partners for Fish and Wildlife Program

The Partners for Fish and Wildlife (PFW) Program is the Service's habitat restoration program for long-term conservation on private land. The Program was established to offer technical and financial assistance to landowners who wish to restore wildlife habitat on their property. Projects can include constructing fences to exclude feral ungulates; controlling feral ungulates, weeds, rodents, and alien insects; restoring native ecosystem elements such as hydrology and micro-habitat conditions; and reintroducing native species.

The Service provides assistance ranging from informal advice on the location and design of potential restoration projects to cost-shared funding under a formal cooperative agreement with the landowner. If warranted, the Service also provides participating landowners with technical assistance to develop Safe Harbor Agreements that cover habitat managed for endangered or threatened species. The Agreements provide assurances to landowners that additional land, water, and/or restrictions on uses of natural resources will not be imposed as a result of their voluntary conservation actions.

Since funding is limited, projects given the highest priority are ones that manage or reestablish natural biological communities and provide long-term benefits to declining migratory bird and fish species, and species that are endangered, threatened, or proposed for listing; and projects on private lands that satisfy the needs of wildlife populations on National Wildlife Refuges.

Under the PFW Program, the Service is cooperating with the Kamehameha Schools, the U.S. Army, and DLNR on the Opae'ula Watershed Protection Project which has the goal of removing ungulates from and fencing a 150-acre area at the summit of the Ko'olau Mountains (Konahuanui), above the Pali Lookout, Manoa Falls, and the Nuuanu Valley Reservoir. The project is located in proposed critical habitat Unit 5, and will enclose native forest which also contains five rare or endangered plant species and two endangered snail species. Future similar PFW projects are anticipated.

The Hawai'i Biodiversity Joint Venture

The Hawai'i Biodiversity Joint Venture (HBJV) is a public-private effort to protect, maintain, improve, and restore the native biological diversity of the Hawaiian Islands. The mission is to work with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats.

The HBJV was initiated with the following goals:

— Maintain natural communities and habitats for native species

— Support efforts to cooperatively manage significant native ecosystems on public and private land

— Develop natural resource management techniques to address widespread threats (such as feral ungulates, weeds, rats, and alien insects) to Hawai'i's native ecosystems

— Restore former wetlands, native forests and other natural communities on public and private lands

— Protect native Hawaiian ecosystems and natural communities through land and water acquisition and management.

Since funding is limited, priority is given to: projects that implement management or research actions that directly contribute to protecting or restoring habitats for multiple endangered, threatened, candidate, or rare species; projects that address key threats to native ecosystems or habitats; and projects that benefit rare or unique ecosystems or habitats.

Pacific Islands Coastal Program

The Pacific Islands Coastal Program is a new effort to identify and conserve important coastal natural resources. The goals of the Program are to:

— Identify and prioritize coastal natural resources and threats

— Implement on-the-ground projects in partnership with others

— Promote public stewardship of coastal fish, wildlife, plants and their habitats.

The objectives of the program include:

— Protecting and restoring coastal wetlands and uplands, anchialine pools, estuaries, coral reefs and streams

— Preventing and eradicating invasive alien species in coastal areas

— Protecting and restoring watersheds for native species' habitat needs

— Building public support through partnerships, education and community involvement

— Inventory and map coastal resources.

Endangered Species Landowner Incentive Program

The Endangered Species Landowner Incentive Program is a focused effort to combine cost-share funds and regulatory relief incentives (Safe Harbor Agreements and Candidate Conservation Agreements) to address high-priority habitat restoration needs of endangered, threatened, and candidate species.

Other Habitat Restoration Programs

Other Habitat Restoration Programs include the National Coastal Wetlands Conservation Grant Program and the North American Wetlands Conservation Grant Program. In addition, the Conservation Partnerships Program seeks to provide a connection between habitat restoration projects and non-Service funding sources.

Wildlife Habitat Incentives Program

Under the Wildlife Habitat Incentives Program (WHIP), the Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture (USDA) provides assistance to landowners and lessees (leases must be for 5 years or more) to protect and restore Hawai'i's native habitats as well as habitats of threatened and endangered species. In Hawai'i, the focus is on the following habitats:

— Threatened/endangered plant species habitat

— Native forests/riparian areas adjacent or connected to a native forest reserve, wildlife refuge, or other preserved forest/riparian area

— Montane wetlands and bogs

— Coastal dunes that support rare plants, seabirds, monk seals, or turtles

— Anchialine pools

— Endangered waterbird and migratory bird habitat

— Caves and rare species

The NRCS works with private landowners and lessees to help them develop a Wildlife Habitat Development Plan for their land that benefits native wildlife and meets other goals and objectives of WHIP. If the Plan is chosen for funding, a 5- to 10-year contract is entered into whereby the landowner or lessee agrees to undertake wildlife habitat development practices such as noxious weed control, fencing, planting of native trees, and wetland restoration. In turn, NRCS reimburses the landowner or lessee 75% of the cost of carrying out these practices at specified rates. However, the funds cannot be used for mitigation of any kind, or on any land designated as converted wetland.

STATE LAND MANAGEMENT

State Districting

For the major islands, all lands in Hawai'i are allocated by the state into one of four districts: Conservation, Agricultural, Urban and Rural. The state, through its Department of Land and Natural Resources (DLNR) and its Board of Land and Natural Resources (the Board) has primary land-management responsibility for activities and development in the Conservation District, while the counties have primary responsibility in the Urban, Rural and Agricultural Districts.

As indicated in Table ES-1, nearly all of the land on O'ahu proposed for critical habitat designation is in the state Conservation District (99.6% or 66,115 acres), while about 208 acres are in the Agricultural District, and 69 acres are in the Urban District. No O'ahu lands are in the Rural District. Because of slight mapping discrepancies due to misaligned borders, however, the last two acreage figures are high. The only agricultural land is 184 acres in Unit 2, and the only urban land is 64 acres in Unit 5.

The Conservation District

The purpose of the Conservation District is to conserve, protect and preserve the state's important natural resources through appropriate management in order to promote the long-term sustainability of these natural resources, and to promote public health, safety and welfare (Hawai'i Revised Statutes, Sect. 183 C-3). To this end, limited development and commercial activity is allowed in the Conservation District. "Important natural resources" include the watersheds that supply potable water and water for agriculture; natural

ecosystems and sanctuaries of native flora and fauna, particularly those which are endangered; forest areas; scenic areas; significant historical, cultural, archaeological, geological, mineral and volcanological features and sites; and other designated unique areas.

Permission is required to use land, construct facilities, or conduct many of the activities in the Conservation District (see below). Permits for routine uses or activities are issued by DLNR, while more complex activities or uses (such as certain construction projects and commercial operations) require formal approval of a Conservation District Use Application (CDUA) by the Board, and often require an approved management plan.

Conservation District Subzones

All land in the Conservation District has been assigned to one of five subzones that reflect a hierarchy of uses from the most restrictive to the most permissive. These subzones are the Protective Subzone (the most restrictive), Limited, Resource, General and Special. Except for the Special Subzone, all uses and activities that are allowed in a more restrictive subzone in the hierarchy are allowed in the less restrictive subzones.

Protective Subzone

The Protective Subzone, the most restrictive of the five subzones, was established to "… protect valuable resources in designated areas such as restricted watersheds … plant and wildlife sanctuaries … and other designated natural and unique areas." Correspondingly, lands and waters generally included in this subzone are needed to protect watersheds, water sources, and water supplies; and to preserve the natural ecosystems of native plants and wildlife, particularly endangered species.

No structures, homes, or farm activities are allowed in the Protective Subzone, with two exceptions. First, the land can be used by state and county governments and by non-government entities that serve the public (e.g., the local utility companies) "for public purpose"—i.e., to fulfill mandated government functions for the public benefit such as transportation systems, water systems, and communications systems or recreational facilities. Second, Native Hawaiians owning *kuleana* land may use it for agriculture or single-family residences if their land was used "historically and customarily" for these purposes. (*Kuleana* land is land that was granted to Native-Hawaiian tenants in the mid-1800s.)

Allowed uses (by permit or Board approval) in the Protective Subzone include: replacing or reconstructing an existing structure and some types of accessory structures, habitat improvements for plant and wildlife sanctuaries, Natural Area Reserves, wilderness areas and scenic areas, limited removal of certain trees, and removal of noxious plants from

small areas provided that the ground is not disturbed significantly. Limited landscaping is allowed, but is restricted to plants that are endemic or indigenous; alien subspecies are specifically prohibited.

About 23,585 acres (about 2,255 acres *occupied* by 'elepaio and 21,330 acres *unoccupied)* distributed among all five of the proposed critical habitat units are in the state's Protective Subzone.

Limited Subzone

The Limited Subzone encompasses areas that are potentially dangerous to the public due to possible flooding, soil erosion, *tsunami* (tidal waves), volcanic activity or landslides. Lands having a general slope of 40% or more are also included in this subzone. The purpose of the Limited Subzone is to limit uses where natural conditions suggest that human activity should be constrained.

In addition to what is permitted in the Protective Subzone, the following activities and uses are allowed in the Limited Subzone by permit or Board approval: accessory structures near existing structures; single-family homes (one per lot) if state and county regulations are followed; agricultural activities; facilities or devices used to control erosion, floods and other hazards; botanical gardens and private parks; landscaping; and removal of noxious plants in areas larger than 10,000 square feet that result in significant ground disturbance.

Just 1,618 acres (about 976 acres *occupied by* 'elepaio *and* 641 acres *unoccupied*) in four of the five proposed critical habitat units are in the state's Limited Subzone.

Resource Subzone

The Resource Subzone encompasses lands that are suitable for growing and harvesting commercial timber or other forest products, park land, and land for outdoor recreation (hunting, fishing, hiking, camping and picnicking, etc.). The purpose of the Resource Subzone is to develop properly managed areas to ensure the sustained use of Hawai'i's natural resources.

In addition to what is permitted in the Protective and Limited Subzones, the following activities and uses are allowed in the Resource Subzone by permit or Board approval: commercial forestry under an approved management plan, and mining and extraction of any material or natural resource.

About 39,777 acres (about 10,274 acres *occupied by* 'elepaio *and* 29,503 acres *unoccupied*) in all five of the proposed critical habitat units are in the state's Resource Subzone.

General Subzone

The General Subzone is used to designate open space where special conservation uses may not yet be defined, but where urban uses may be premature. This subzone encompasses lands that may not be adaptable to or needed currently for urban, rural or agricultural use. The General Subzone also includes lands that are suitable for farming, flower gardening, nursery operations, orchards and grazing. Golf courses are not allowed.

In addition to what is permitted in the Protective, Limited and Resource Subzones, facilities necessary for the above-mentioned uses are allowed by permit when these facilities are compatible with the natural physical environment, and the use promotes natural open space and scenic value.

Just 1,136 acres (about 361 acres *occupied by* 'elepaio *and* 774 acres *unoccupied*) distributed among four of the five proposed critical habitat units are in the state's General Subzone.

Special Subzone

Special Subzones are designated for educational, recreational and research purposes. These subzones set aside lands possessing unique developmental qualities that complement the natural resources of an area.

None of the proposed critical habitat units for the O'ahu 'elepaio are in the state's Special Subzone.

Additional Management in the Conservation District

In addition to the five subzones in the Conservation District, the state has established further controls by defining other areas it manages within the Conservation District. These include Forest Reserves, the Natural Area Reserve system, state Hunting Units, state parks and state trails. These are discussed below.

Forest Reserves

State Forest Reserves were first established in Hawai'i over a century ago to protect the supply of high-quality water that was being threatened due to the destruction of Hawai'i's rainforests. The stated purpose of the Forest Reserve is to protect native ecosystems and important watersheds (Hawai'i Revised Statutes, Sect. 183-2 and 183-17). Most of Hawai'i's Forest Reserves are in the Resource Subzone. Limited collecting for personal use (e.g., *ti* leaves and bamboo) is allowed by permit, as is limited (no more than

$3,000 value per year) commercial harvesting of timber, seedlings, greenery and tree ferns. Commercial forestry operations are allowed only with approval from the Board. Permission is required to reside in a Forest Reserve, hunt (see below), camp and fish. Land vehicles, mountain bikes, horses, mules and leashed dogs are allowed on designated roads and trails.

Collecting endangered or threatened plants or wildlife is not allowed and, except in the situations described above or with Board approval, no forms of plant or animal life may be removed, injured or killed.

All or portions of all the proposed critical habitat units totalling nearly 17,000 acres (about 1,381 acres *occupied* by 'elepaio and 15,610 acres *unoccupied*) overlap with eight of O'ahu's nine state Forest Reserves. This includes the Ewa, Honolulu Watershed, Kuaokala, Kuliouou, Mokule'ia, Nanakuli, Waiahole, and Wai'anae Kai Forest Reserves. This amounts to about 66% of the total Forest Reserve acreage on O'ahu.

Natural Area Reserves

A Natural Area Reserve (NAR) is based on the concept of protecting ecosystems rather than just single species, with the goal of preserving and protecting representative samples of Hawaiian biological ecosystems and geological formations (Hawai'i Revised Statutes, Sect. 195-5). Although most NARs are located in the state Conservation District, they can include land in other Districts.

Management activities in a NAR include restoring and enhancing existing populations of native plants, removing non-native weeds, and working with local hunters to keep non-native animal populations low in sensitive areas.

Permitted activities in a NAR include hiking, nature study and bedroll camping. Game hunting and research or educational activities are allowed by permit. Prohibited activities in a NAR include: improvements or construction; tent camping; vehicles, except on designated roads; and removing, injuring, killing or introducing plants or wildlife.

Two NARs are entirely within the boundaries of proposed critical habitat Unit 1.

— Pahole NAR (658 acres)

The Pahole NAR covers a complex valley system in the northern Wai'anae Mountains. The area is known for its natural diversity and extends from the summit ridge down to the dry lowlands. The Reserve contains a rare dry forest and a rare mesic forest and is a home to endangered Hawaiian tree snails. Other lowland mesic forests and dry shrub lands, as well as a Hawaiian intermittent stream community are represented.

— Ka'ala NAR (1,100 acres)

The Ka'ala NAR includes Ka'ala, the highest point on the island of O'ahu (4,020 feet) in the northern Wai'anae Mountains. This fog-shrouded Reserve features steep, wet slopes that descend from a montane bog to semi-wet foothills.

Hunting Units

A total of 47 game Hunting Units have been established across the state to control game hunting (Hawai'i Administrative Rules, Title 13, Chapters 122 and 123). O'ahu has nine Hunting Units totalling about 26,200 acres for hunting feral pigs and goats, pheasant (2 species), Francolin (3 species), chukar partridge, quail (3 species), and dove (2 species).

Hunting is a licensed activity and is restricted within Hunting Units by: bag limits, hunting method (rifles, shotguns, handguns, spears, bows and arrows, dogs and knives); days allowed (daily or weekends and holidays), hunting seasons; and hours of the day. Bird game hunting on private land is subject to the same restrictions as it is on state-managed land, while hunting restrictions for the game mammals on private land are set by the landowner. DLNR's intent is to manage the hunting areas, game-mammal populations, and the level of hunting activity to achieve a reasonable balance between (1) recreational benefits for hunters and (2) protection to native ecosystems and threatened and endangered plants.

Portions of four proposed critical habitat units—about 5,900 acres in the Wai'anae Mountains and about 7,500 acres in the Ko'olau Mountains—are in Hunting Units. This 13,400 acres (about 2,200 acres *occupied* by 'elepaio and 11,200 acres *unoccupied*) amounts to a little over half of the total state-managed Hunting Unit acreage on O'ahu.

State Parks

The state Parks system was established to govern the use and protection of all lands and historical and natural resources in Hawai'i's state parks (Hawai'i Revised Statutes, Sect. 184-3 and Sect. 184-5). Within state parks, approvals are required from the Board to erect communications equipment (such as aerials, antennas and transmitters), vacation cabins, and concession facilities. Activities requiring permits include limited camping, lodging (e.g., private and state cabins), fresh-water fishing, and hiking on certain trails. Uses allowed without a permit from DLNR include camping, limited collecting of renewable products (fruits, berries, flowers, seeds, and pine cones) for personal use; hiking; picnicking; and mountain biking (unless posted signs indicate otherwise). O'ahu has 23 state-administered parks, monuments, wayside areas and recreation areas.

Portions of two proposed critical habitat units overlap three of these state-administered parks:

— Kaena Point State Park (779 acres)

Kaena Point State Park is located on the leeward shore and westernmost point of O'ahu at Kaena Point. A 5-mile trail leads along the coastline from Yokohama Bay to Kaena Point. Facilities include restrooms and showers, and the primary activities in the main portion of the Park are fishing and hiking.

Proposed critical habitat Unit 1 includes just 5 acres of the easternmost tip of the Kaena Point State Park. This land is in the mountains where there are no Park facilities or activities.

— Kahana Valley State Park (5,000 acres)

Located on the eastern shore of O'ahu, Kahana Valley State Park encompasses the beach at Kahana Bay and the lush interior valley and forest lands up to the ridge of the Ko'olau Mountains. Park facilities include an orientation center, cultural resources, picnic tables, hiking trails, a beach area, and campsites. Over 100 people live within the Park boundaries.

Proposed critical habitat Unit 3 contains about 2,100 acres (42%) of the Park. This area is located in the back of the valley, and includes some of the valley walls up to the ridgeline; about 520 acres are *occupied* by 'elepaio and 1,580 acres are *unoccupied*. This mountainous area includes no park facilities and only secondary hiking trails. Park activities are limited to hiking for the more adventurous, and to game hunting. Waiahole Ditch and water diversions are found along the valley walls below the ridgeline.

— Keaiwa Heiau State Recreation Area (385 acres)

Lying in the mountains northwest of Pearl Harbor, the Keaiwa Heiau State Recreation Area protects a variety of cultural and natural resources including the Keaiwa Heiau (a 15th-century healing temple), a eucalyptus forest, guava trees, and native Hawaiian trees. Park facilities include campsites, picnic tables, trails, showers and restrooms; activities include hiking, sightseeing, picnicking and exploring.

Proposed critical habitat Unit 3 includes 337 acres (88%) of this recreation area; 48 acres are *occupied* by 'elepaio and 289 acres are *unoccupied.*

State Trail and Access Program

The purpose of the state Trail and Access Program is to preserve and perpetuate the integrity, condition, naturalness and beauty of state trails and surrounding areas, and to protect … environmental resources (Hawai'i Revised Statutes, Sect. 198D-11 and 198D-6).

Activities allowed under this program by permit from DLNR include camping, hunting and fishing. Some trails are designated for commercial activity (e.g., commercial hikes on designated trails), but no commercial activity is permitted on a trail if it will compromise the quality and nature of the experience or cause any damage to the integrity or condition of the trail or the surrounding environment. Prohibited uses include collecting, removing, injuring or killing a plant or animal; and introducing plants or wildlife.

Numerous state trails are located in proposed critical habitat Units 1, 3 and 5. In addition, numerous trails that are not maintained by the state are found in all of the units.

Natural Area Partnership (NAP) Program

Under the Natural Area Partnership (NAP) program, the state provides two-thirds of the management costs for private landowners who agree to permanently protect intact native ecosystems, essential habitat for threatened and endangered species, or areas with other significant biological resources. The NAP program can support a full range of management activities to protect, restore, or enhance significant native resources or geological features.

To qualify, the applicant must be a landowner or manager of private lands of high natural area quality. Other requirements include: (1) permanent dedication of the private lands through a transfer of fee title or a conservation easement to the state or a "cooperating entity" such as The Nature Conservancy of Hawai'i, and (2) management of the lands according to a detailed management plan approved by the Board of Land and Natural Resources. A "cooperating entity" is a private non-profit landholding organization or any other body deemed by the DLNR as satisfactorily able to assist in the management of natural areas.

None of the owners of private land in the proposed critical habitat units are currently involved in a NAP program.

The Hawai'i Endangered Bird Conservation Program

The Hawai'i Endangered Bird Conservation Program is a partnership composed of non-profit conservation organizations, private landowners, and government agencies including DLNR and the Service.

The mission of the Program is to recover native Hawaiian ecosystems at the landscape level and to establish self-sustaining bird populations in the wild, using management programs that include captive propagation and reintroduction. Their efforts employ an integrated conservation strategy of research, habitat management, and public education, with a focus on ecosystem health and protection as a prerequisite to reintroduction.

In the case of the O'ahu 'elepaio, participants in the Program are collaborating with the Honolulu Zoo to develop techniques for propagating 'elepaio in captivity and then releasing them.

STATE SPECIES PROTECTIONS

Protection of Threatened and Endangered Wildlife and Ecosystems

The state has established various laws and administrative rules to protect threatened and endangered wildlife and their ecosystems. The Administrative Rule "Indigenous Wildlife, Endangered and Threatened Wildlife, and Introduced Wild Birds," implements an Act that was specifically designed to conserve, manage, protect and enhance indigenous wildlife, endangered and threatened wildlife, and introduced wild birds (Hawai'i Administrative Rules, Chapter 13-124). With regard to threatened and endangered wildlife species, prohibited activities include *taking*, possessing**,** processing, selling, offering for sale, or transporting these species. Nor can their nests be removed, damaged or disturbed, or their young, eggs, dead body or skin be removed from the state of Hawai'i. Nor does DLNR issue permits to destroy or otherwise control threatened or endangered species of wildlife or introduced wildlife. However, these rules do not apply to authorized employees of DLNR, the state Department of Agriculture, and the Service if the employees are acting in the course of their official duties.

Similarly, the state has established various laws and administrative rules to protect threatened and endangered plants and their ecosystems, which in turn helps protect wildlife. The Administrative Rule "Threatened and Endangered Plants," implements an Act that was specifically designed to conserve, manage, protect and enhance native threatened and endangered plants (Hawai'i Revised Statutes, Sect. 195D). Prohibited activities include the taking, selling, delivering, carrying, shipping, transporting, or exporting of any native endangered or threatened plant. However, license holders may sell such plants if the plants are garden-grown.

And as discussed above, additional protections of threatened and endangered wildlife and ecosystems are embedded in separate laws governing the state Conservation District, state Forest Reserves, state parks, and designated state trails. Also, the state has laws to protect, conserve and preserve ecosystems in NARs, as well as native ecosystems and important watersheds in state Forest Reserves. And under the NAP program, the state

shares in the land management costs of private landowners who agree to permanently protect intact native ecosystems, essential habitat for threatened and endangered species, or areas with other significant biological resources. Limited taking of flora is allowed, but only in state parks and state Forest Reserves, and only if the flora is not endangered or threatened. In state parks, collecting or gathering reasonable quantities of natural renewable products—such as fruits, berries, flowers, seeds, and pine cones—is allowed for personal use without a permit. In Forest Reserves, limited collecting for personal use (e.g., *ti* leaves and bamboo) and limited commercial harvesting (e.g., timber, seedlings, greenery and tree ferns) is allowed by permit. Commercial forestry operations are allowed only with approval of the Board.

State Environmental Assessments and Environmental Impact Statements

Hawai'i state law calls for efforts to prevent or eliminate damage to the environment and biosphere and to protect endangered species and indigenous plants and animals. To meet this and other goals, Hawai'i's Environmental Impact Statement (EIS) law (Hawai'i Revised Statutes 343), which is administered by the state Office of Environmental Quality Control (OEQC), requires that an Environmental Assessment (EA) and/or EIS be prepared for many development projects. The law requires that government give systematic consideration to the environmental, social and economic consequences of proposed development projects before granting permits for construction. For impacts on biological resources, OEQC guidelines call for biological surveys, an ecosystem impact analysis, and proposed mitigating measures. The requirements and guidelines apply to development projects in all four state Districts.

COUNTY LAND MANAGEMENT

While the state manages land in the Conservation District, the City and County of Honolulu (the county) has primary management responsibility for land in the other three state Districts: Agricultural, Urban and Rural. Also, development along the shoreline is subject to county regulation, regardless of state districting. Finally, the Board of Water Supply manages some watershed land in the Conservation District.

Agricultural District

Crops, livestock and grazing are permitted in the Agricultural District, as are accessory structures and farmhouses. Although land in the Agricultural District is not meant to be urbanized, in practice, it is sometimes used for large-lot subdivisions.

Land in the state Agricultural District proposed for critical habitat designation amounts to about 184 acres (about 101 acres *occupied* by 'elepaio and 83 acres *unoccupied*) in proposed critical habitat Unit 2. (Table ES-1 indicates that units 1, 3 and 5 contain land in the Agricultural District, but these small acreage reflect mapping discrepancies.)

Urban District, General Preservation

In the Urban District, land use and development (commercial, industrial, residential, etc.) are subject to the county's community plans, zoning, building code regulations, and land-use regulations.

On O'ahu, about 64 acres (all *occupied* by 'elepaio) in proposed critical habitat Unit 5 are in the Urban District. (Table ES-1 indicates that Unit 3 contains a small amount of acreage in the Urban District, but this reflects a mapping discrepancy.)

The 64 acres are zoned P-2, General Preservation. The purpose of P-2 zoning is to preserve and manage major open space and recreational lands, and lands of scenic and other natural resource value. Land with this zoning can provide visual relief and contrasts well against the many buildings in a city, or P-2 land can serve as outdoor space for public use and enjoyment. P-2-zoned land also includes areas that are unsuitable for other uses due to topographical considerations related to public health, safety and welfare.

Honolulu Board of Water Supply

To preserve watershed, the Honolulu Board of Water Supply manages nearly 4,000 acres (about 1,300 acres *occupied* by 'elepaio and 2,700 acres *unoccupied*) in three of the proposed critical habitat units in the Ko'olau Mountains. This amounts to 6% of the total proposed critical habitat acreage.

OTHER LAND MANAGEMENT

Ko'olau Mountains Watershed Partnership

The Ko'olau Mountains Watershed Partnership (KMWP) was formed in October 1999 to protect the watershed areas of the Ko'olau Mountains and to maintain high-quality water for the island of O'ahu. The watershed runs the length of the Ko'olau range, covering about 97,561 acres (over 150 square miles). It encompasses the vegetated portion of the Ko'olau Mountains from the summit area down to the old forest reserve boundary that was established in the early 1900s; this boundary is at a lower elevation than the existing state Forest Reserve boundary. Nearly all of the area is in the Protective and Resource Subzones

of the Conservation District while a small portion of it is in the Limited Subzone. A very small portion of the KMWP is in the Urban District.

The watershed includes state Forest Reserves, state-managed Hunting Units, state parks, state trails, a portion of the watershed owned by the county Board of Water Supply, the O'ahu Forest NWR, most of the Kawailoa Training Area, and a large portion of Schofield Barracks East Range.

Members of the KMWP include the Federal government (the Service and the United States Army), the state (DLNR's Division of Forestry and Wildlife and the Department of Hawaiian Homelands), the Honolulu Board of Water Supply, the Waiahole Water System, large private landowners (including Kamehameha Schools, Dole Foods and the Queen Emma Foundation), and small private landowners.

With funds from the state, Kamehameha Schools and the Hawai'i Community Foundation, the KMWP is developing a comprehensive management plan for the watershed; formulating projects to combat threats of fire, weeds, animals, insects, disease and human impacts on the watershed; and seeking cost-shared Federal funding for these projects. Following completion of the plan, a coordinator will be hired to implement the management actions in the plan.

All of proposed critical habitat Unit 4 and nearly all of Units 3 and 5 are located within KMWP. The overlap totals nearly 47,900 acres (about 7,340 acres *occupied* by 'elepaio and 40,560 acres *unoccupied*), amounting to 73% of the proposed 'elepaio critical habitat and nearly half of the KMWP.

Honouliuli Preserve

The Honouliuli Preserve (the Preserve), which encompasses 3,962 acres on the steep southeastern slope of the Wai'anae Mountains, is home to nearly 70 rare and endangered plants and animals species and is also an area for research and education, community service, cultural preservation, and enjoyment of open space. Since 1990, TNCH has held a long-term lease over the land from the Estate of James Campbell.

A private, non-profit affiliate of a national organization, TNCH works with Federal, state and private partners to protect Hawai'i's natural areas that shelter native species. Its mission is to preserve Hawai'i's native plants, animals, and natural communities by protecting the lands and waters needed for their survival.

In managing the Preserve, TNCH has developed a "2001 - 2005 Honouliuli Preserve Master Plan" with the primary long-term goal being to protect the Preserve for future generations. The five key natural resource management strategies set out in the Plan are: (1) control the three most serious threats (wildfires, alien plants and alien animals), (2) restore

habitat, (3) protect and recover rare and endangered species, (4) promote research that guides and enhances Preserve management programs, and (5) ensure safe and efficient management of the Preserve. The Plan was developed with the assistance of an advisory group and with additional input from the community. Annual Operational Plans for the 5-year master-plan period are being developed. Key public involvement strategies include community partnerships; community outreach and education; and training professionals, interns and volunteers in conservation techniques and related activities.

Although TNCH is managing nest predators (primarily rodents) successfully on a small scale in the Preserve, adequate reduction of this threat will require larger scale management that protects more 'elepaio. The other primary threat—introduced diseases carried by the mosquito—has not been managed in any of the proposed 'elepaio critical habitat. Since the Service has determined that, to date, management of the specific threats to the 'elepaio have not been of a sufficient scale in the Preserve to preclude proposed designation of critical habitat, the entire Preserve is being included in proposed critical habitat Unit 2. About 1,740 acres of the Preserve are *occupied* by 'elepaio and 1,870 acres acres are *unoccupied*.

SUMMARY

In the absence of critical habitat designation, existing Federal and state protections for threatened and endangered plant and wildlife species, state and county land-use controls affecting public and private lands, and land management by various public and private organizations provide substantial protections for the O'ahu 'elepaio and its proposed critical habitat, including both *occupied* and *unoccupied* areas.

At the Federal level, the most significant existing protection of the O'ahu 'elepaio derives from its being listed by the Service as endangered because, when species are listed by the Service, Federal agencies are required to consult with the Service to ensure that activities they fund, authorize, or carry out are not likely to *jeopardize* the continued existence of the species. Also, the ESA prohibits the *taking* of any threatened or endangered wildlife species (except for approved incidental *takings*), including *takings* that could result from the destruction or alteration of the habitat for the species. In addition, much of the *unoccupied* portions of the proposed critical habitat would still be subject to consultations because of the presence of listed species other than the 'elepaio. Also, the O'ahu Forest NWR will be managed to provide habitat for the 'elepaio and for other threatened and endangered species, and military lands will be managed in accordance with approved INRMPs.

State protections of threatened and endangered species include: (1) limited development in the Conservation District, its subzones, and other areas they define and manage within the Conservation District; (2) laws specifically addressing the protection of

threatened and endangered species; and (3) requirements that an EA and/or an EIS address the impacts that proposed development projects have on biological resources. Compliance with these state requirements (1) reduces the number of projects that are subject to consultation with the Service, (2) expedites consultations with the Service because much of the information must be generated to comply with the state requirements, and (3) reduces the number of modifications required by the Service to allow proposed projects to proceed.

At the county level, the most significant protections for the critical habitat being proposed for the O'ahu 'elepaio are watersheds managed by the Board of Water Supply, land-use restrictions on land in the Agricultural District, and land-use restrictions on land in the Urban District that is zoned General Preservation.

Also, in the Ko'olau Mountains, public and private landowners have entered into a Watershed Partnership to protect watershed ecosystems. In the Wai'anae Mountains, TNCH is managing the Honouliuli Preserve to protect and restore habitat and native species.

PHYSICAL AND SOCIOECONOMIC PROFILE OF O'AHU SECTION 4

To provide the context for evaluating the economic impacts of the proposed critical habitat designation, this section presents a physical description and socioeconomic profile of the island of O'ahu.

PHYSICAL DESCRIPTION OF O'AHU

O'ahu lies near the middle of the Hawaiian chain, with the islands of Kaua'i and Ni'ihau to the northwest, and Moloka'i, Maui, Lana'i, Kaho'olawe, and Hawai'i lying to the southeast—see Figures ES-2.

The third oldest and third largest of the eight major Hawaiian islands, O'ahu is 597 square miles in land area. It consists of four main geomorphologic features: the Wai'anae Range and the Ko'olau Range (two shield volcanoes), the Schofield Plateau, and the coastal plain.

Aligned perpendicular to the prevailing northeast tradewinds, the 22-mile-long Wai'anae Range forms the western portion of the island, while the 37-mile-long Ko'olau Range forms the eastern portion. Huge valleys have been carved into the Wai'anae Range, while the Ko'olau Range is deeply eroded by streams and has high cliffs along most of its eastern side. The highest point on O'ahu, Mt. Ka'ala in the Wai'anae Range is 4,025 feet, while the highest point on the Ko'olau Range is Pu'u Konahuanui at 3,105 feet.

The two mountain ranges produce distinctive windward and leeward climates. Annual rainfall exceeds 250 inches per year on the crest of the Ko'olau Range, while leeward coastal areas receive less than 20 inches of rainfall annually. Typical of older and eroded areas, Oahu's two mountain ranges host highly diverse regional flora.

All five of the proposed critical habitat units are located in the mountains: Units 1 and 2 are located in the Wai'anae Range, and Units 3, 4 and 5 are located in the Ko'olau Range.

SOCIOECONOMIC PROFILE

Table 4-1 summarizes economic and demographic information about the City and County of Honolulu (the county), which encompasses the entire island of O'ahu, as well as the uninhabited Northwest Hawaiian Islands.

Population and Distribution

In 1999, O'ahu had an estimated population of 864,571 residents, accounting for 73% of the state's population of 1,185,597 residents. When visitors are included, the 1999 *de facto* population on O'ahu was 913,222 people.

Because of slow economic growth during the 1990s—due largely to declines in tourism and military activity—O'ahu experienced slow population growth: up just 3.4% for the resident population and 1.9% for the *de facto* population.

Most O'ahu residents live on the south side of the island east of Pearl Harbor, in residential areas located on the coastal plains, in valleys, and on the lower portion of mountain ridges that separate valleys. Residential areas elsewhere on O'ahu are on coastal plains and valleys surrounding the island, and in the Central O'ahu plain. Most new growth is being directed to 'Ewa in the southwest corner of the island, and to the southern portion of Central O'ahu.

There are no existing or planned residential communities in the Wai'anae and Ko'olau ranges in areas proposed for critical habitat designation.

The principal uses of the critical habitat units by the general public are hiking on mountain trails, related sightseeing, and game hunting. Also, domestic water consumed on O'ahu begins its journey as rainfall in the Wai'anae and Ko'olau watersheds. A healthy watershed is of critical importance on an island with no alternative sources of supply other than expensive desalination.

Primary Economic Activities

The economy of O'ahu is driven primarily by (1) its role as the government, service, commercial, and transportation center for the state; (2) a large visitor industry; (3) military activities; (4) agriculture; and (5) high-technology activities.

Government, Service, Commercial and Transportation Center

With its superb natural harbors, dry leeward climate, and abundant freshwater streams descending from the Ko'olau Range, Honolulu became the government, service, commercial and transportation center for the Hawaiian Islands by the early 1800s.

Continuing in this role to the present, Honolulu serves as the government center of the state, housing most of Hawai'i's state and Federal offices. It is also the primary center for legal, financial, accounting, medical and other professional services. And Honolulu Harbor and the Honolulu International Airport serve as the primary transportation hubs for the Hawaiian Islands, resulting in Honolulu being the primary distribution and commercial center for the state. Also, Honolulu is the home of the main campus of the University of Hawai'i as well as of most of Hawaii's private universities and colleges.

Tourism

Tourism is the dominant economic activity on O'ahu. The island hosted about 4.6 million visitors in 1999 and had an average daily visitor population of about 29,500 tourists (see Table 4-1). However, tourism declined during the 1990s due to the prolonged economic recession in Japan and increased competition from the Neighbor Islands and visitor destinations elsewhere in the world. The annual number of visitors and the visitor census were down 14.8% and 9%, respectively, since 1990. The smaller decline in the visitor census was due to a shift in the mix of visitors, with more American visitors and fewer Japanese: the duration of stay is longer for Americans.

Since 2000, O'ahu's visitor industry has been on the rebound. Contributing factors include (1) the robust economic growth in California and other western states, (2) a new convention center, and (3) aggressive marketing.

Nearly all of the resorts and hotels on O'ahu are located in or near Waikiki, which is on the south shore of the island. However, there is a major resort on the southwest shore, and another on the north shore.

The principal uses by visitors of the proposed critical habitat units are hiking on mountain trails and related sightseeing.

Military

The military has been a major contributor to O'ahu's economy since the late 1930s, surpassing planation agriculture in economic importance in the 1940s and being surpassed by tourism in the 1960s.

In 1999, 41,360 military personnel and 44,350 military dependents were stationed in Hawai'i, most of whom lived on O'ahu. However, the numbers are down about 26% since 1990.

About 11,660 acres of land proposed for 'elepaio critical habitat are used by the military for training or as a safety zone for training and other military activities.

Agriculture

For nearly a century, sugar and pineapple were the economic mainstays on O'ahu, with sugar plantations located mostly in the lower elevations on the north and south shores, and pineapple plantations located at the higher elevations in the saddle between the Wai'anae and Ko'olau Ranges. The last two sugar planations on O'ahu closed in the early and mid-1990s, but two large pineapple planations (Dole and Del Monte) remain, although their canneries have been closed. Pineapple is cultivated for the fresh market, which is possible because of low backhaul rates and frequent shipping and air-cargo service to the U.S. mainland. Much of the pineapple is carried in the holds of wide-bodied aircraft serving the visitor industry.

While plantation agriculture decreased significantly on O'ahu since the early-1990s, many of the former sugarcane fields have been replanted in diversified crops (i.e., all crops other than sugarcane or pineapple). Diversified crops include: vegetables, watermelons and other fruits, seed corn, taro, and flowers and nursery products. Most of the agricultural land that is unsuitable for growing crops is used for grazing.

While the economic significance of agriculture on O'ahu is now small in comparison to tourism, it remains a major user of land and water.

Irrigation water for agriculture comes directly or indirectly from rainfall in the watershed areas which include the areas proposed for critical habitat. In the early 1900s, elaborate water systems were built in the mountains to supply water to surgarcane plantations. These systems, which are still in use, include high-elevation water tunnels and stream diversions to capture large volumes of water, and ditch systems to deliver the water to farm areas many miles away. Thus, the watershed and water systems are of critical importance to the survival of agriculture on O'ahu.

High-Technology Activities

O'ahu has a growing high-technology industry based on a combination of natural advantages and links to various research organizations, most of which are based at the University of Hawai'i, Manoa. Major initiatives include (1) biotechnolgoy, covering tropical agriculture, marine biology, biomedical technology, functional genomics, biomanufactur-

ing, etc.; (2) health care, covering education, telemedicine, health information technology; etc.; (3) natural resources and the environment, covering aquaculture, materials research, environmental and other sensors, environmental remediation, environmental information management systems, etc.; and (4) information technology, covering call centers for Asian markets, software, advanced information systems, etc.

Labor Force and Employment

In 1999, Oahu's civilian labor force numbered about 424,250 workers, up 5.5% since 1990. Employment reached 403,300 workers in 1999, up only 2.5% from 1990. Oahu's 1999 unemployment rate was 4.9%.

As employment increased only slightly on O'ahu during the 1990s, the number of wage and salary jobs decreased 2.4% to 401,650 jobs. Most of these jobs were concentrated in services (hotel, tourism, and health) and government. The number of wage and salary jobs rose moderately in these two categories but declined in all the remaining categories: construction and mining; manufacturing; transportation, communications and utilities; trade (retail and wholesale); finance, insurance and real estate; and agriculture.

Personal Income

In 1999, the O'ahu total personal income and per-capita income were $25.5 million and $25,465, respectively—amounts that increased from 1990 levels by about 28% and 24%, respectively. However, per-capita income failed to keep pace with inflation as measured by the Consumer Price Index, which increased 25.5% over this same period.

OUTLOOK FOR CHANGES AFFECTING CRITICAL HABITAT UNITS

Given O'ahu's slow economic and population growth, combined with the topography of the island, the importance of the watershed for both potable and irrigation water supply, the location of existing urban and agricultural activities, county plans for the location of future development, and state land-use restrictions on development in the mountains and watershed areas, no significant changes in land use are expected in or near the proposed critical habitat units.

Table 4-1. Socioeconomic Profile of O'ahu

Item	1990	1999	Growth '90 to '99
Population			
Resident	836,231	864,571	3.4%
de Facto Population	896,260	913,222	1.9%
Visitors			
Annual Visitors	5,350,940	4,560,142	-14.8%
Average Visitor Census	87,400	79,497	-9.0%
Labor			
Civilian Labor Force	402,300	424,250	5.5%
Employed	393,300	403,300	2.5%
Unemployment Rate	2.2%	4.9%	
Jobs, Wage and Salary Only	411,500	401,650	-2.4%
Construction, mining	24,000	15,900	-33.8%
Manufacturing	15,800	12,750	-19.3%
Trans., communication, utilities	34,200	31,850	-6.9%
Trade	102,550	96,500	-5.9%
Finance, insurance, real estate	29,600	27,950	-5.6%
Services and miscellaneous	115,450	124,000	7.4%
Government	87,600	90,500	3.3%
Agriculture	2,300	2,200	-4.3%
Personal Income			
Total ($ million)	$ 19,921.7	$ 25,474.6	27.9%
Per capita	$ 23,772	$ 29,465	23.9%
Consumer Price Index—All Urban Consumers, Honolulu	138.1	173.3	25.5%

Source: Department of Business, Economic Development & Tourism. The State Data Annual.

IMPROVEMENTS AND ACTIVITIES IN THE CRITICAL HABITAT UNITS — SECTION 5

This section presents relevant information on the current and planned improvements and activities in the five critical habitat units. The information is used in defining the "baseline scenario," which assumes no critical habitat designation. In Section 7 of this report, the economic impacts attributable to critical habitat designation are based on deviations from this baseline scenario.

OVERVIEW

Little development has occurred and very little more is expected in the five critical habitat units proposed for the O'ahu 'elepaio. Most areas within the units are unsuitable for development because of their rugged mountain terrain, lack of access, and remote locations. Furthermore, existing land-use controls severely limit development in the units in order to protect the island's watersheds, forests, native plants and wildlife, etc. (see Section 3).

Existing improvements are limited to a few paved roads, unpaved roads, trails, camping and picnic facilities, an equipment staging area and nursery, an arboretum, a satellite tacking facility, communications complexes, power transmission lines, water improvements (tunnels and wells to extract water, stream diversions, ditches to transport water, gaging stations, etc.), and a few cabins. Activities within these units are also limited. The predominant uses are hiking, game hunting, and military training.

EXISTING IMPROVEMENTS AND ACTIVITIES

At the bottom of Table ES-1, the section entitled "Improvements/Activities" identifies the existing improvements and activities in the proposed critical habitat units by whether the location is *occupied* or *unoccupied* by the 'elepaio. Improvements and activities are indicated in the tables by dots (•). In the case of improvements, multiple dots indi-

cate multiple improvements—one for each dot. But if there are five or more improvements, then the number of improvements is shown in parentheses rather than by multiple dots. And when an improvement transverses both *occupied* and *unoccupied* areas (e.g., a road, trail, or power transmission line), it is represented by a single dot in each of the columns, *Occupied*, *Unoccupied*, and Total. The information on improvements and activities was gathered largely from various resource maps.

By proposed critical habitat unit, existing improvements and activities are:

— Unit 1: Northern Wai'anae Mountains (11,122 acres)

Known improvements include two paved roads (one to the old Nike station above Dillingham Airfield and the other to the top of Ka'ala); at least four unpaved roads and four-wheel-drive trails; a complex of hiking trails; camp grounds at Peacock Flats; an equipment staging area, nursery, and a communications tower at the old Nike station; a satellite tracking station and communications tower at Ka'ala; and water improvements (water tunnels and gaging stations).

Activities include hiking and hunting. Also, two portions of the unit serve as a safety zone for military-training activities—one as part of Makua Military Reservation and the other as part of Schofield Barracks West Range.

— Unit 2: Southern Wai'anae Mountains (6,215 acres)

At the south end of the unit, known improvements include a paved road, an unpaved road, O'ahu's largest communications complex, and six cabins which are used as full-time homes. Also, a long north-to-south contour trail is located on the east side of the mountain, along with a number of linking trails.

Activities include limited hiking and hunting. Also, two portions of the unit serve a safety zone for military activities, one as part of Lualualei Naval Magazine/Radio Transmitting Facility and the other as part of Schofield Barracks South Range.

— Unit 3: Central Ko'olau Mountains (36,669 acres)

Known improvements include a paved road; a number of unpaved roads/four-wheel-drive trails; a large number of hiking trails; nearly all of Keaiwa Heiau State Recreational Area; two power transmission lines that cross the unit; a large number of water improvements, including Waiahole Ditch and related water diversions and tunnels; and a small number of homes.

Activities include hiking and hunting, and military training at Kawailoa Training Area and Schofield Barracks East Range.

— Unit 4: Kalihi-Kapalama (1,977 acres)

Known improvements and activities are limited to two water tunnels and hunting.

— Unit 5: Southern Ko'olau Mountains (10,371 acres)

Known improvements include two paved roads; a number of unpaved roads/four-wheel-drive trails; a large number of hiking trails; most of the grounds of Lyon Arboretum, excluding the buildings and parking area; two communications complexes; three power transmission lines that cross the unit; and a number of water improvements (including Maunawili Ditch and source tunnels).

Activities include hiking and hunting.

Except for a few cabins which are used as homes, no residential, commercial, industrial, or golf-course projects are located in any of the units. Also, no farming or farm-animal grazing is known to take place in any of the units. Unit 5 does have about 184 acres located in the State Agricultural District, but this land is in a military base and is unsuitable for farming because of steep slopes.

ANTICIPATED DEVELOPMENT AND CHANGES IN ACTIVITIES

For the "baseline scenario," which assumes no critical habitat designation, no agricultural, residential, commercial, or industrial development or other significant development or change in land-use activities is anticipated in any of the proposed units. This outlook is based on known plans, developmental problems (i.e., rugged mountain terrain, difficult access, and remote locations), and applicable land-use controls that severely limit development in the Wai'anae and Ko'olau Ranges.

Most construction activity is expected to be limited to repairing and occasionally improving existing facilities (roads, trails, park and campground facilities, communications facilities, power transmission lines, water improvements, etc.).

However, new improvements within the proposed units will include new roads, trails and helicopter pads in Unit 3 to provide better access to the O'ahu Forest NWR, and may include new communications facilities at the southern end of Unit 2 and possibly other areas.

METHODOLOGY FOR THE ECONOMIC IMPACT ANALYSIS SECTION 6

This section presents the methodology used to estimate the economic impacts of the proposed designation of critical habitat for the O'ahu 'elepaio. The first subsection presents an overview of the methodology used in the analysis, followed by a critique of the approach ordered by the U.S. Court of Appeals for the Tenth Circuit in May 2001. The third sub-section describes in more detail the analytical concepts and steps used in conducting the analysis.

OVERVIEW OF THE METHODOLOGY

The focus of any economic impact analysis is on the changes that will result from an action, and the economic costs and benefits associated with these changes. In determining the changes, the common practice is to determine the difference between (1) a "with" the action scenario, and (2) a "without" the action (or "baseline") scenario. The difference between the two scenarios is sometimes referred to as the "incremental economic impact" to emphasize the fact that this difference represents the change that would occur over and above the baseline scenario.

The focus of the analysis in this report is on the economic impact of the proposed action to designate certain lands as critical habitat for the O'ahu 'elepaio. Thus, the "with" scenario assumes critical habitat designation, while the "without," or baseline scenario assumes no critical habitat designation. Furthermore, the baseline scenario recognizes that the O'ahu 'elepaio is already listed as an endangered species. In effect, the economic impact of the critical habitat designation for this species is the incremental economic impact over and above the economic impact of its being listed.

It is this incremental economic impact information that is relevant to the Service as it considers whether to include in the final rule all of the lands they have proposed for critical habitat designation, or whether to exclude some lands because the cost of including them

would be too high to the potentially affected parties. For the most part, the significant economic impacts of the critical habitat designation will occur on lands that are *unoccupied* by 'elepaio since these are the lands that would become subject to section 7 consultation with the critical habitat designation. The *occupied* lands are already subject to consultation with the species listing.

The approach is similar in concept to purchasing an item that comes with optional add-ons. For illustration, it is assumed that an item has already been purchased (i.e., the O'ahu 'elepaio has already been listed). Now, a separate decision is being made about whether to purchase add-ons to the item. In making this decision, the relevant information is not the cost of the original item that was already purchased, nor is it the combined cost of the original item that was already purchased plus the optional add-ons that have not yet been purchased. Rather, the relevant information is the costs and benefits of the optional add-ons that are under consideration. Simply put, are the benefits of the add-ons sufficient to justify purchasing them given their cost, irrespective of how much was paid for the basic item? A decision might be made to not purchase add-ons because the basic item serves the intended purpose adequately, and the add-ons may be too expensive in comparison to the added benefit (i.e., a decision might be made to designate only *occupied* lands for critical habitat because this is adequate for the survival and recovery of the species, while a larger critical habitat that would include *unoccupied* lands would entail excessive expense for potentially affected parties). Or a decision might be made to go ahead and purchase some add-ons because they are necessary for the proper functioning of the item, and they are indeed affordable (i.e., a decision might be made to designate a critical habitat that includes *unoccupied* lands because the lands are needed for the survival and recovery of the species, and the cost is affordable to the potentially affected parties).

APPROACH ORDERED BY THE TENTH CIRCUIT COURT

In a ruling that does not apply to the Ninth Circuit Court (which includes Hawai'i), the U.S. Court of Appeals for the Tenth Circuit rejected a version of the incremental economic impact approach outlined above. The Court based this decision on its opinion that: (1) no incremental economic impacts would result from designating critical habitats over and above the economic impacts that would result from species listings, and (2) Congress would not require such a meaningless economic analysis. With regard to the first point, the Court's observation holds true only under special circumstances: that is, when all the proposed critical habitats are fully *occupied* by the listed species for which the critical habitats are being proposed. But if a proposed critical habitat contains *unoccupied* land, this land would become subject to section 7 consultation when it was not before. This expansion in the geographic scope of consultations could have significant economic impacts.

In place of the methodology described above, the Tenth Circuit Court concluded that "Congress intended that the (Service) conduct a full analysis of all of the economic impacts of a critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes" (e.g., to the listing of a species as threatened or endangered).

A proper economic analysis—one that would follow the spirit of the order of the Tenth Circuit Court and provide useful information to the Service to allow proper decision-making—would require comparisons among three scenarios. Scenario 1 is a baseline scenario with no species listing and no proposed critical habitat designation; Scenario 2 assumes a species listing but no proposed critical habitat designation; and Scenario 3 assumes both the species listing and the proposed critical habitat designation. Analyses for Scenarios 2 and 3 would require estimating their incremental economic impacts over and above the baseline scenario. But to determine the economic impact of the proposed critical habitat designation, the economic impacts of Scenarios 2 and 3 would have to be compared to determine their differences. As is evident, this Tenth Circuit approach would require more research and analysis at greater expense than the approach described above in "Overview of Methodology."

Returning to the analogy used above, under Scenario 1, no item would be purchased, nor would any add-ons. Under Scenario 2, the item would be purchased, but no add-ons would be purchased. Under Scenario 3, the item would be purchased and so would specified add-ons. In order to find the cost of the add-ons, one would have to determine the cost of the basic item (Scenario 2) and the combined cost of the item and add-ons (Scenario 3), then take the difference.

This difference between the economic impacts of Scenarios 2 and 3 (i.e., the incremental impacts attributable to the designation of critical habitat) is the relevant information to the Service's decision about whether to include in the final rule all, or only some portion, of the lands they have proposed for critical habitat designation. It is also the same information provided by the approach described above in "Overview of Methodology."

In deference to the Tenth Circuit Court's ruling, the analytical approach used in this report has been adjusted to provide more detailed information on the baseline scenario. This includes past and projected costs and benefits attributable to the species listing where such data for the estimates are reasonably available. However, the focus of the analysis remains on estimating the economic impacts needed by the Service to make informed decisions about designating critical habitat—that is, the focus is on the incremental economic impacts that are attributable to the critical habitat designation over and above those economic impacts attributable to the species listing and other existing regulations and protections.

ANALYTICAL CONCEPTS AND STEPS

The general approach used to estimate the economic impacts of the proposed critical habitat designation involved the following analytical concepts and steps, as appropriate:

— Projects, Land Uses and Activities Subject to Analysis

The economic analysis focused primarily on the "reasonably foreseeable" projects, land uses, and activities that could affect the physical and biological features of the proposed critical habitat units. In turn, these were the activities that could be affected by the critical habitat designation.

"Reasonably foreseeable" projects, land uses, and activities are defined for the purposes of this report as those which: (1) are currently authorized, permitted, or funded; (2) are proposed in plans currently available to the public; or (3) are projected or are likely to occur within the next decade based on (a) recent economic or land-use trends, development patterns, evolving technologies, competitive advantages, etc., and (b) limits imposed by land-use controls, access, terrain, infrastructure, and other restrictions on development. Current and future activities that could potentially result in section 7 consultations and/or modifications are considered to be reasonably foreseeable.

— Background Information

In order to provide context for the analysis, and to the extent that information is reasonably available, background information is provided on projects, land uses, and activities that are subject to the analysis. Depending upon the situation, this background information may include: (1) the location of a project, land use, or activity; (2) whether the project site is *occupied* or *unoccupied* by the O'ahu 'elepaio or other listed species; (3) a description of the project, land use, or activity, including its magnitude; (4) the amount of economic activity associated with the project, land use, or activity (e.g., revenues and employment); and (5) any past and projected section 7 consultations, project modifications and associated costs, and benefits that would be attributable to the presence of the O'ahu 'elepaio.

— *Federal involvement*

For the current and planned projects, land uses, and activities that could impact the physical and biological features of the proposed critical habitat units, the next step in the analysis was to determine *Federal involvement*. As discussed in Section 2, Federal agencies must consult with the Service whenever an activity they fund, authorize, or carry out may affect designated critical habitat. When consultations concern an activity on

Federal lands, the relevant Federal agency consults with the Service. When consultations involve an activity proposed by a state or local government or by a private entity, the Federal "action agency" to the activity consults with the Service. For example, the Army Corps of Engineers is the agency that issues section 404 permits under the Clean Water Act and so is the action agency.

Activities on State, county, municipal and private lands that do not have a *Federal nexus* (i.e., they do not involve Federal funding, a Federal permit, or other Federal actions) are not restricted by critical habitat designation. Therefore, these activities were not addressed further in this analysis.

— Activities Subject to Consultation in Practice

In practice, not every single project, land use, and activity that has a *Federal nexus* has been subject to section consultation with the Service. Thus, the analysis was further confined to those projects, land uses, and activities which are, in practice, likely to be subject to consultation. This assessment was based on a review of past consultations, current practices, and the professional judgments of Service and other Federal agency staff.

— *Adverse Modification* of Critical Habitat

In determining whether there is *adverse modification* to a critical habitat, the Service analyzes the proposed project, land use, or activity, and determines whether it will *adversely modify* the habitat containing the *primary constituent elements* that are regarded by the Service as being essential for conservation of the listed species. As explained in Section 1, the *primary constituent elements* for 'elepaio are described by features such as space for individual and population growth and for normal behavior; food, water, air, light, minerals and other nutritional or physiological requirements; cover or shelter; sites for nesting and rearing of offspring; and habitats that are protected from disturbance and are representative of the historic geographical and ecological distributions of the species**.**

If an action will not *adversely modify* the critical habitat, either directly or indirectly, the Service reaches a "no *adverse modification"* conclusion, and no further consultation with the Service is necessary. Except for the cost in time and effort of all parties involved in the consultation with the Service, the proposed project, land use, or activity will not be impacted by the critical habitat designation.

— Man-Made Features and Structures

In practice, the operation and maintenance of existing man-made features and structures normally would result in a "no *adverse modification"*

conclusion because they do not contain, and are not likely to develop, any *primary constituent elements.* Examples are the operation and maintenance of existing buildings, roads, aqueducts, telecommunications equipment, arboreta and gardens, and *heiau* (an ancient Hawaiian place of worship or shrine). In such cases no consultation, or a minimal informal consultation, may be required. Activities falling into this category were not considered further in the analysis.

An equivalent interpretation is that existing man-made features and structures that do not contain, and are not likely to develop, *primary constituent elements* are not included in the critical habitat designation. In effect, these features and structures create unmapped holes that are located within the boundaries of a critical habitat unit, but these holes are not part of the unit.

— Focus on Incremental Impacts

The analysis evaluated the incremental economic costs and benefits that are expected to result from the proposed critical habitat designation over and above those resulting from all other existing Federal, state, and county land-use controls and environmental protections. If some other existing statute, regulation, or policy limits or prohibits a land use or activity, the economic impacts associated with those limitations or prohibitions are not attributable to critical habitat designation.

To determine these incremental economic impacts, the analysis compared a "with" critical habitat designation scenario against a "without" critical habitat designation (or baseline) scenario, and estimated the net change in economic activity that would be attributable to the proposed critical habitat designation. The difference between the two scenarios is the incremental change in economic activity that is likely to result from the proposed critical habitat designation.

Under the baseline “without” critical habitat scenario, the Federal and state governments already protect the O'ahu 'elepaio. For the Federal government, the most significant existing protection derives from the Federal listing of the O'ahu 'elepaio as an endangered species. Because of the listing, section 7 consultations with the Service are already required to ensure that activities are not likely to *jeopardize* the continued existence of the species. Also, the ESA prohibits the *taking* of any threatened or endangered wildlife species (except for approved incidental *takings*), including *takings* that could result from the destruction or alteration of the habitat of the species. Even if 'elepaio are not present in a given area, consultations with the Service may be required because of the presence of other listed species.

State protections include land-use restrictions for activities in the state Conservation District and specific protections of threatened and endangered species and their ecosystems.

— *Occupied* versus *Unoccupied* Critical Habitat

This economic analysis focuses on the portions of proposed critical habitat units that are *unoccupied* by 'elepaio because the Service expects that any potential incremental economic costs and benefits from critical habitat designation will occur predominately on *unoccupied* lands. This reflects the fact that, for *occupied* lands, section 7 consultations with the Service are already required to ensure that proposed activities are not likely to *jeopardize* the continued existence of the species.

As discussed in Section 3, the area subject to section 7 consultations may extend beyond the known current range, depending on the effect from an action located outside the known range.

There are, however, some cases involving *occupied* lands where ongoing or planned land uses and activities may require re-initiations of consultations that have already been conducted under a species listing, or they may even require new consultations that would not normally be required with a species listing.

— Other Listed Species

Regarding the *unoccupied* portion of the 'elepaio critical habitat units, a distinction was made between areas where other listed species are known to be present, and areas where no known listed species are present. If other listed species are known to be on or near (within approximately 1/3 mile) a project site or activity having *Federal involvement*, then consultation with the Service will already be necessary due to the existing species listing, even without the 'elepaio critical habitat designation. However, the critical habitat designation would result in an expansion of the scope of the consultation to consider whether the project would impact the *primary constituent elements* essential to the survival and recovery of the 'elepaio.

If a project is located in the *unoccupied* portion of the critical habitat and no other listed species are known to be on or near the project site, then the critical habitat designation would trigger a section 7 consultation that would not otherwise be required.

— Changes in Consultations, Projects, Land Uses and Activities

For the remaining list of current and planned projects, land uses, and activities that are likely to be subject to consultation in actual practice—and

consistent with the focus on incremental impacts—the next step in the analysis was to estimate incremental changes in the quantity and nature of the consultations and to estimate the changes that are likely to occur in such items as project designs, schedules, land uses, activities and programs.

In some cases, a project or activity can be modified during informal consultation with the Service to avoid adverse impacts on the species or its habitat. If not, the Service may determine during formal consultation that the project or activity can proceed as is, or that the project can proceed subject to "reasonable and prudent" changes. The latter occurs when the Service determines that the project or activity, as modified, will not *jeopardize* the continued existence of a listed species, or destroy or *adversely modify* its critical habitat to such an extent that the project appreciably diminishes the value of the habitat for the survival and recovery of the species.

It was assumed in the analysis that landowners, Federal agencies and state agencies comply with section 7 of the ESA and other Federal and state laws. Also, the estimates reflect the availability of information which, in many cases, was limited (e.g., the outcome of future consultations will not be known until they occur).

— Economic Effects of the Incremental Changes

The final step in the analysis was to estimate the economic effects of the incremental changes in the consultations, projects, land uses and activities. The kinds of economic costs and benefits that were considered included, but were not limited to, changes in revenues, costs, employment, property values, and the distribution of benefits.

In many cases, some types of benefits and costs were impractical to value, largely due to the lack of market prices or existing economic studies on which to base values (e.g., the economic value of preserving certain species).

The methodology outlined above relied primarily on information provided by the Service, the State of Hawai'i's Department of Land and Natural Resources (DLNR), the City and County of Honolulu, and the consultant, Decision Analysts Hawai'i, Inc. (DAHI). To better understand the concerns of stakeholders, the Service solicited comments and suggestions from the public, other concerned government agencies, the scientific community, industry, and other interested parties concerning aspects of the proposed rule and the proposed critical habitat units. These comments and suggestions were taken into consideration in conducting the economic analysis. Additional clarifications were obtained from landowners and other parties.

POTENTIAL ECONOMIC COSTS AND BENEFITS OF THE CRITICAL HABITAT DESIGNATION SECTION 7

This section presents the analysis of incremental economic costs and benefits for the projects, land uses, and activities that could be affected by designation of the proposed critical habitat units for the O'ahu 'elepaio.

OVERVIEW OF FINDINGS

For the most part, the critical habitat designation would have modest economic impacts for the following reasons:

- Very few new developments, commercial projects, land uses, and activities are expected in the proposed critical habitat units. This is due to (1) lands that are largely unsuitable for development and most other activities because of their rugged mountain terrain, lack of access, and remote location; and (2) existing land-use controls that severely limit development and most other activities in the mountainous areas of O'ahu.
- Some of the current and planned projects, land uses, and activities that could affect the proposed critical habitat units have no *Federal involvement* requiring section 7 consultation with the Service, so they are not restricted by the requirements of the ESA.
- Most of the activities where there is *Federal involvement* involve the operation and maintenance of existing man-made facilities and structures, so they would not be impacted by the critical habitat designation.
- Some activities would be subject to the minimal level of informal section 7 consultation because they do not adversely impact 'elepaio or its habitat.

— For a number of the new projects, land uses, and activities that have *Federal involvement*, the incremental economic impacts over and above the economic impacts that would have occurred with existing Federal, state and county protections would be small or negligible. This reflects the fact that listed species (either 'elepaio or other listed species) are present in about half the acreage in the proposed critical habitat units. As a result, section 7 consultation will already be necessary in these areas to ensure that proposed activities are not likely to *jeopardize* the continued existence of the listed species.

For the most part, the larger economic impacts resulting from the 'elepaio critical habitat designation would be limited to a small number of projects and activities that: (1) are new or represent a major modification, addition or expansion; (2) have *Federal involvement*; (3) are located in the *unoccupied* portions of the 'elepaio critical habitat units; and (4) are located in an area where, like the 'elepaio, no other listed species are found on the project site or nearby. In view of items (3) and (4), the critical habitat designation would trigger a section 7 consultation that would not otherwise be required.

Economic benefits occurring as a result of designating critical habitat for the O'ahu 'elepaio, and the related actions taken to control threats to the 'elepaio (principally rodent control), would include: (1) the economic benefits of preserving the 'elepaio, (2) the economic benefits of preserving other species that would increase in number and range as a consequence of the rodent control, and (3) an expansion in ecotourism.

SECTION 7 CONSULTATIONS

Service records indicate that from the time of the O'ahu 'elepaio listing in October 1998 until critical habitat was proposed, two informal section 7 consultations and no formal consultations with the Service were conducted. The first informal consultation, conducted in October 2000, was internal to the Service and involved posting of the boundaries for the O'ahu Forest NWR. The boundary posting effort required hiking into the area, clearing some vegetation, and using a small helicopter to transport materials and personnel to two work sites. In this informal consultation, the Service found that 'elepaio would not be adversely affected by the posting activities. The other informal consultation, conducted in March 2001, involved installing reservoirs in an area where no 'elepaio were located. Because both of these consultations also addressed potential impacts on listed plants and other wildlife, only a portion of the cost of the consultations is attributable to the listing of the 'elepaio.

Future consultations involving the O'ahu 'elepaio and its proposed critical habitat, many of which would also involve other species, are expected to include:

— military activities and possibly occasional military projects (e.g., fencing to protect habitat)

— occasional projects to improve access to the O'ahu Forest NWR (e.g., roads, trails and helicopter landing areas)

— occasional new communications facilities that require a Federal operating permit

— Federally funded wildlife restoration and game-hunting projects in state-managed Hunting Units

— Federally funded endangered species programs

The consultations would focus on the activities that could adversely affect 'elepaio critical habitat, including but not limited to:

— Removing, thinning, or destroying 'elepaio habitat (as defined in the *primary constituent elements* discussion), whether by burning, mechanical, chemical, or other means (e.g., woodcutting, grading, overgrazing, construction, road building, mining, herbicide application, etc.).

— Appreciably decreasing habitat value or quality as an indirect effect of an action (e.g., introduction or promotion of potential nest predators, diseases or disease vectors, vertebrate or invertebrate food competitors, or invasive plant species; forest fragmentation; overgrazing; augmentation of feral ungulate populations; water diversion or impoundment, groundwater pumping, or other activities that alter water quality or quantity to an extent that affects vegetation structure or produces mosquito breeding habitat; and activities that increase the risk of fire).

Participants in the consultation would include the Service, the Federal applicant (or Federal action agency in the case of a non-Federal applicant), and the non-Federal applicant, if any.

Although the Service does not charge fees for consultations, participants in consultations normally spend time on such efforts as assembling information about the project and the site; preparing for one or more meetings; participating in meetings; arranging for biological surveys and the associated reports, if any; responding to letters and phone calls; and changing project plans, if needed. Based on the typical times required for these efforts and their level of complexity (low, medium, or high), and on standard hourly rates, Industrial Economics, Inc. (an economic and environmental consulting firm) estimates costs to participants in the consultations to be as shown below:

Estimated Cost of a Section 7 Consultation

Entity	Low	Medium	High
U.S. Fish & Wildlife Service	$1,000	$ 3,100	$ 6,000
Federal Action Agency or Federal Applicant	$1,300	$ 4,100	$ 6,100
Total for Federal Agencies	$2,300	$ 7,200	$12,100
Non-Federal Applicant (if any)	$1,200	$ 2,900	$ 4,100
Total (in the case of the Non-Federal Applicant)	$3,500	$10,100	$16,200

Source: Industrial Economics, Inc. (IEc), Cambridge, Massachusetts.

In addition, biological assessments could range from as little as $3,200 for a standard assessment of 100 acres or less, up to $24,000 or more for a highly complex, environmentally sensitive, or politically sensitive assessment.

For projects and activities having *Federal involvement* that are located in geographic areas of the proposed critical habitat units that are *occupied* by 'elepaio, consultations with the Service will be required regardless of whether or not critical habitat are designated for 'elepaio. Thus, little or no incremental costs would be attributable to the critical habitat designation above and beyond what is already attributable to the existing 'elepaio species listing. Occasional exceptions could arise, however, when consultations would not have been required with a species listing; e.g., when a proposed activity is located near the boundary of an *occupied* unit.

Similarly, for projects and activities having *Federal involvement* that are located in geographic areas of the proposed critical habitat units that are *unoccupied* by 'elepaio but where other listed species are present, consultations with the Service will be required regardless of whether or not critical habitat are designated for 'elepaio. However, the scope of the consultations would be expanded to consider whether the project would impact the *primary constituent elements* essential to the survival and recovery of the 'elepaio. Thus, a modest increase in costs would be attributable to the critical habitat designation above and beyond what is already attributable to the presence of listed species other than the 'elepaio.

But if a project is located in the *unoccupied* portion of the critical habitat unit and no other listed species is known to be on or near the project site, then the critical habitat designation would trigger a section 7 consultation that would not otherwise be required. In this

case, the full cost of consultation would be attributable to the designation of critical habitat for the 'elepaio.

LAND MANAGEMENT TO PROTECT CRITICAL HABITAT

Threats to 'Elepaio

Threats to the survival and ultimate recovery of the O'ahu 'elepaio come from (1) nest predators (i.e., the black rat); (2) diseases, particularly avian pox and avian malaria which are carried by the introduced southern house mosquito; and (3) loss of habitat due to fires, land clearing, etc. Feral pigs are a secondary threat because pig wallows are breeding grounds for mosquitoes.

Actions to Support the Survival and Recovery of 'Elepaio

The management actions needed to assure the survival and recovery of the O'ahu 'elepaio focus on controlling threats, reintroducing 'elepaio into selected areas, and monitoring 'elepaio populations. These actions include: (1) rodent control; (2) mosquito control; (3) fire prevention and control; (4) feral ungulate control; (5) propagation, reintroduction and/or augmentation of existing 'elepaio populations into areas deemed essential for their recovery; and (6) monitoring 'elepaio populations.

Regarding rodents, the primary ground-based approach currently used to control them is to use snap traps and, in remote areas, bait boxes containing rodenticide blocks based on the chemical Diphacinone. Although poisonous to rats, Diphacinone is safe for human consumption and has, in fact, been used as a blood thinner for human cardiac patients since 1952. A normal daily dosage of the blood-thinning medication would be equivalent to 1.3 pounds of the Diphacinone pellets. Also, farmers throughout the United States use Diphacinone to control rodents and, in Hawai'i it is used to control rats in sugarcane fields and in macadamia nut orchards. Diphacinone is safer than the rat poisons being sold over the counter in Hawai'i.

To lower the cost of rodent control, the Service and DLNR are investigating the possibility of using aerial drops of this rodenticide. Subject to approval by the U.S. Environmental Protection Agency and the Hawai'i Department of Agriculture, and subject to public acceptance of this approach, a helicopter would be used to spread marble-sized pellets containing the chemical at a density of 10 pounds per acre (one 8-gram pellet per 62 square feet), followed by a second application 5 to 7 days later. Starting with the first application, large forested areas would be closed to hunters and hikers for about 30 days. The timeline for EPA approval is not known. The quantity of the rodenticide used in aerial drops would be safe to humans as well as hunting dogs and O'ahu's feral pigs and goats because of the small dosage that would be applied and because the chemical breaks down rapidly. Aerial

drops of even stronger poisons have been used extensively and successfully in New Zealand to clear areas of rodents and mongooses.

Regarding mosquito control, no effective approach has yet been developed.

On O'ahu, the Service regards pigs and other ungulates (hoofed mammals) at their current density as a secondary threat to the survival and recovery of 'elepaio. In fact, the highest density of 'elepaio on O'ahu is found at Schofield Barracks West Range (subpopulation B in Figure ES-1), which also has a high density of feral pigs. In protected forest areas on O'ahu, the primary motivation for controlling ungulates is not to protect 'elepaio, but to protect native forests, particularly threatened and endangered plants and their ecosystems. Standard approaches for controlling ungulates are discussed in the next subsection.

Fire prevention and control may involve placing limits on live-fire training, creating wide fire breaks to separate 'elepaio habitat from training areas, cutting or removing vegetation that can contribute to the rapid spread of fires, and responding more quickly to control fires. Note, however, that the need to control fires in forested areas is important not just to the 'elepaio, but to all forest flora and fauna.

Land-Management Costs

Based on the Maui Forest Bird Project, the Service estimates that ground-based predator (rodent) control, including equipment and materials for both trapping and baiting the rodents, would cost about $39 per acre per year using current methods. This cost would be lower in large areas if rodents could be cleared from them in the first year, after which these areas could be maintained in a rodent-free state using a less costly control program on the perimeter of the cleared area. Furthermore, over the long term, if aerial application of Diphacinone is approved by the EPA and acceptable to the public, the cost could drop well below $39 per acre per year.

Total annual cost for managing selected areas for the survival and recovery of the 'elepaio would depend on total managed acres and other factors. For example, not all managed areas would be subject to the more expensive efforts in the same year; the per-acre cost would probably decrease because of economies of scale for large areas; the cost would be lower if aerial application of Diphacinone is approved by the EPA; and, over time, the cost would decrease because of reduced threats from rodents.

Partnership Funding

Subject to the availability of funds and of private landowners' willingness to participate, programs to help private landowners cover the cost of managing their lands to benefit 'elepaio and other species, include: (1) the state's Natural Area Partnership (NAP) Program,

through which the state provides two-thirds of approved costs, (2) the Services's Conservation Partnerships Program which provides cost sharing, and (3) the U.S. Natural Resources Conservation Service (NRCS) Wildlife Habitat Incentives Program (WHIP), which provides 75% of the costs. These programs are described in Section 3.

However, these partnership programs are not funded adequately to include all of the lands being proposed for critical habitat designation in Hawai'i.

Contribution of the Proposed Critical Habitat Designation

If an area is selected for additional land management to assure the survival and recovery of the O'ahu 'elepaio, the decision would be based on (1) the quality of the habitat for 'elepaio and, possibly, whether 'elepaio are present in the area; (2) other considerations, such as the quality of the forest, the presence of other listed species, watershed management, and good land stewardship; and (3) financial incentives in the form of Federal and state partnership programs. The critical habitat designation would help identify areas that would benefit from this additional land management.

However, the critical habitat designation would not require land management beyond what is required by the ESA. That is, the critical habitat designation would not require (1) creating any reserve, refuge, or wilderness areas; (2) fencing for any reason; (3) removing rodents, ungulates, or weeds; (3) closing any area to hunters or hikers; (4) closing an area to hunters or hikers; (5) initiating recovery projects to reintroduce 'elepaio or augment existing populations; or (6) preparing special land-management plans.

Land-Management Costs Due to the Proposed Critical Habitat Designation

The decision to control threats to the O'ahu 'elepaio in order to increase its population and range is a separate decision from designating 'elepaio critical habitat. Thus, the cost of these land management activities would be attributable to this separate decision.

GAME HUNTING

The Game-Management Issue

One of the major issues surrounding the critical habitat designation proposed for Hawai'i concerns the management of game-mammal populations (e.g., feral pigs and goats). This is a highly sensitive issue throughout the state that has been debated for many decades.

The debate about ungulates primarily concerns the damage they do to threatened and endangered plants, but it extends to native birds that depend on a healthy forest for their

survival. As documented in recovery plans for native plants, the major threat to the survival and ultimate recovery of Hawai'i's threatened and endangered plants comes from ungulates, combined with competition from non-native plants. Also, the highest ranked management action needed to assure the survival and ultimate recovery of Hawai'i's listed plants is "feral ungulate control." Consistent with this finding, the Service opposes land management that allows or enhances the free ranging of large populations of feral ungulates in areas having vulnerable plant species. Measures to control ungulates in protected areas typically include strategic or barrier fencing to prevent or limit their migration into designated areas, exclosure fencing to prevent them from entering protected areas, extensive hunting and trapping to remove them from protected areas, and one-way gates that allow pigs to leave but not to enter an area.

While many hunters accept the need to protect portions of the native forest from damage by ungulates, the majority of hunters are opposed to removing game mammals from large portions of existing hunting areas. And they fear that designation of critical habitat could lead to a loss of prized hunting areas as was the case with the court-ordered eradication of sheep and goats from the palila critical habitat on the Island of Hawai'i 20 years ago (see below). Instead, most hunters advocate that game-mammal populations continue to be sustained at levels that are sufficient to allow recreational and subsistence hunting in all but possibly a few of the existing Hunting Units. They also see themselves as important contributors to controlling feral ungulate populations at reasonable levels and at little cost to the taxpayer.

Hunters and DLNR have also expressed concern that critical habitat designation could affect wildlife management projects that are partially funded by the Service under the Pittman-Robertson Act (see below).

Affected Units and Acreage

Units 1, 3, 4 and 5, overlap 13,400 acres of public Hunting Units (about 2,200 acres *occupied* and 11,200 acres *unoccupied*), or about 51% of the 26,200 acres of public hunting lands on O'ahu. In addition, the proposed critical habitat units include private lands that are available for game hunting but are not managed by DLNR as part of the state's Hunting Units. Public access to some of these private lands is limited.

Hunting Activity and Value

Hunting Activity

Hunting is an important activity for many O'ahu residents because it provides recreation, subsistence, and a desired lifestyle. Also, hunting is largely a local activity with few of the game-mammal hunters coming from off-island. Game mammals hunted on the island

include feral pigs and goats—i.e., the ungulates that are viewed as a threat to the survival and ultimate recovery of Hawai'i's native plants. Game birds include pheasant (2 species), Francolin (3 species), chukar partridge, quail (3 species), and dove (2 species).

In 1996, 23,000 hunters in Hawai'i, most of whom were local residents, spent an estimated 258,000 days hunting (1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation). Approximately 70% of their hunting trips was spent hunting game mammals and the remaining trips were for game birds.

Based on hunting licenses issued, about 25% of the state's hunters live on O'ahu. However, because O'ahu has only 2.6% of the total state-managed hunting lands, many O'ahu hunters travel to the Neighbor Islands to hunt and, on average, O'ahu hunters probably hunt less frequently than their Neighbor Island counterparts. In the calculations which follow, it is assumed than 10% of the hunting activity in the state takes place on O'ahu.

Economic Activity Associated with Hunting

In 1996, hunters in Hawai'i spent an estimated $16.4 million on hunting, of which about $8 million was trip-related and about $8.4 million was for equipment and other expenses (1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation).

On O'ahu, economic activity supported by just game-mammal hunting in 1996 amounted to about $1.2 million in direct sales, $2.2 million in total direct and indirect sales, 40 jobs, and $950,000 in income. These figures are order-of-magnitude estimates based on 70% of the hunting trips being spent hunting game mammals and 10% of the state's hunting activity taking place on O'ahu, and on multipliers from the Hawai'i Input-Output Model.

Because the proposed critical habitat takes up about half of the public hunting lands on O'ahu (see above), the amount of economic activity associated with game-mammal hunting in the proposed units would be about half the above figures.

Value of Hunting to Hunters

The net value of hunting to hunters is the amount they would be willing to pay to hunt above and beyond what they actually pay for equipment, supplies, travel, etc.—an amount referred to by economists as "consumers' surplus." It is the extra value consumers derive from consuming an item compared to what they actually spend on the item. Net willingness to pay (consumers' surplus) is the standard measure of value used in benefit-cost analyses.

For O'ahu, the estimated value of just game-mammal hunting in 1996 amounted to about $450,000, based on (1) the assumption that hunters value their experience at $25 per

day above and beyond their actual expenditures and (2) the numbers of days spent hunting (258,000 days x 70% on game mammals x 10% for O'ahu). The valuation of hunting at $25 per day is consistent with estimates from a number of studies on hunting (Donnelly and Nelson, Young, et al., and Shulstad).

Because the proposed critical habitat takes up about half of the public hunting lands on O'ahu (see above), the estimated value of game-mammal hunting in the proposed critical habitat units would be about half the above figure.

Federal Nexus **and the Pittman-Robertson Act**

The *Federal nexus* for game management on O'ahu is the Federal funding provided to DLNR by the Service to restore and rehabilitate wildlife habitat and to support wildlife management research. The funding is provided as part of the Federal Aid in Wildlife Restoration Act, commonly referred to as the Pittman-Robertson Act. This Act was passed by Congress in 1937 to help restore the nation's wildlife following accumulated damage to forests and grasslands and extensive commercial killing of wildlife. Hawai'i's local hunters help fund this program, since revenues for it are derived from an 11% Federal excise tax on the price of sporting arms, ammunition, and archery equipment, and a 10% tax on handguns. Each state's share of these revenues is determined by a formula that considers the total area of the state and the number of licensed hunters in the state. Each state provides matching funds of at least 25% of the program costs from a non-federal source. Also, each state specifies how the funds are to be spent, while the Service serves as an administrative check to insure that the funds are spent in compliance with the ESA.

In Hawai'i, total funding amounts to nearly $1.1 million for FY2001, of which about $817,000 is Federally funded and about $272,000 is state-funded. About $129,500 will be allocated to game-management programs on O'ahu, plus another $52,550 for non-game programs.

Section 7 Consultations

Because of the *Federal nexus* (i.e., the Pittman-Robertson Act) and the presence of listed plants and wildlife (including the O'ahu 'elepaio) throughout much of the public hunting lands, consultations with the Service already take place on wildlife management projects that are partially funded under the Pittman-Robertson Act. However, if critical habitat is designated for the O'ahu 'elepaio, the scope of the section 7 consultations would be expanded to include hunting lands that contain no listed species but overlap with *unoccupied* 'elepaio critical habitat. Section 7 consultations would not involve hunting activities on private lands that are not managed by the State.

DLNR Game Management

DLNR is the state agency responsible for managing game-mammal populations in state Hunting Units. However, it must carry out this responsibility in the context of two conflicting mandates: provide for sustained-yield recreational hunting in some of the Hunting Units and protect native plants, wildlife, and ecosystems in other areas.

DLNR achieves what it regards as a reasonable balance between the two mandates by varying its approach according to site conditions (e.g., animal population and food supply), and depending upon whether a particular area is nearly pristine, highly degraded, or somewhere in between these two extremes. The most liberal hunting (e.g., year-round pig hunting) is permitted in nearly pristine areas that have suffered the least environmental damage. This helps keep game-mammal populations low in these sensitive areas, thereby minimizing harm to native ecosystems and to endangered and threatened plants. However, hunting is not possible in many remote areas because they are inaccessible to hunters.

In highly degraded areas where DLNR sees no hope that the vegetation will return to native forest, hunting is restricted in order to sustain larger populations of game mammals (see next paragraph for the methods used to restrict hunting). When hunting is restricted, the larger populations allow hunters to harvest more animals each year than would be the case with smaller populations. In addition to the recreational benefits to hunters of having higher game harvests, reasonable numbers of game mammals are available to browse on the non-native plants and weeds, thereby helping control the seed reservoir of noxious non-native plants and their spread into other areas.

Within each Hunting Unit, DLNR controls the amount of hunting activity by using such restrictions as: bag limits, hunting method (rifle, muzzleloader, bow and arrow, dogs and knives); days allowed (week-ends and holidays only), hunting seasons; hours of the day; and for some areas, a limit on the number of daily permits issued.

It should be noted, however, that Service staff and other biologists question the effectiveness of DLNR's game-management approach in protecting native forests, arguing that so long as large populations of feral ungulates are free to range, they will migrate into areas that are not degraded, possibly because they are fleeing from hunters or searching for better forage than what they can find in degraded game production areas. In turn, their migration into these areas will contribute to the loss of native forest.

Loss of Hunting Area Due to the Palila Critical Habitat Designation

Based on past experience, hunters throughout Hawai'i associate critical habitat designation with losing prized hunting areas. Although a parallel situation does not exist with the proposed critical habitat for the O'ahu 'elepaio, the association is based on the palila critical habitat on the Island of Hawai'i.

In 1975, the Service listed the palila (*Psittirostra bailleui*), a Hawaiian honeycreeper (a bird), as an endangered species. The palila depends entirely on the *mamane-naio* ecosystem—a broad band of sparse forest encircling Mauna Kea between about 7,000 and 10,000 feet elevation. In 1977, in an effort to further protect the palila, the Service designated the palila critical habitat, encompassing about 67,000 acres (105 square miles) of hunting land.

Palila were at risk because sheep and goats on Mauna Kea browsed on the *mamane* trees in the *mamane-naio* ecosystem, which was very destructive to the palila's habitat. Starting in the late 1940s, the population of game mammals on the mountain was allowed to increase to allow sustained harvest by hunters. Even after the palila was listed as endangered and its critical habitat was designated, DLNR continued to manage the feral sheep and goat populations at sustainable levels for hunting, causing continued harm to the palila's habitat.

This situation led the Sierra Club Legal Defense Fund to file a lawsuit in Federal court, *Palila v. Hawaii Department of Land and Natural Resources,* to require DLNR to remove the feral sheep and goats from Mauna Kea. The case tested the ESA prohibition on the *taking* of any endangered species of fish or wildlife, where *take* is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." At issue was whether modifying a habitat (i.e., in this case sheep browsing on *mamane* trees) may result in "harm" to a species thereby meeting the definition of *taking.*

In 1979, a Federal court rendered an opinion in support of the plaintiff. Since studies showed clearly that the sheep and goats were "destroying or altering" the palila habitat, the court ordered DLNR to eradicate them from Mauna Kea and this was nearly achieved by 1981. The ruling did not affect the management of pigs on the mountain.

Following this case, the Service regulations defined harm to be "an act which actually kills or injures wildlife." The regulations further explain that "[s]uch act may include significant modifications where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering."

Even though Hawai'i hunters associate critical habitat designation with eradicating game animals and loss of prized hunting areas, a situation similar to the palila critical habitat would not apply to the proposed critical habitat for the O'ahu 'elepaio. The reasons for this is that, in the opinion of the Service, ungulates on O'ahu at their current densities do not pose a significant threat to the habitat of the 'elepaio. If the Service did believe that ungulates pose a serious threat to 'elepaio, the *taking* provision would have already been applied based on the listing of the 'elepaio as endangered, regardless of whether or not critical habitat are designated.

Impact of Critical Habitat Designation on O'ahu Hunting

As discussed in the previous subsection, the Service regards ungulates at their current density as a secondary threat to the survival and recovery of the O'ahu 'elepaio, especially since the highest density of 'elepaio is found in an area having a high density of feral pigs (subpopulation B in Figure ES-1). Accordingly, the Service's draft recovery plan for the O'ahu 'elepaio does not call for fencing to be built in any areas open to public hunting. While DLNR and other land managers might change their approach to managing game-mammals in various hunting areas, such a change would be for reasons other than for the survival and recovery of 'elepaio—such as protecting native forests, endangered plants and their ecosystems, and watersheds.

In view of the Service's draft recovery plan, and assuming no change in game-management by DLNR in favor of increasing game-mammal populations on O'ahu, the designation of critical habitat for the O'ahu 'elepaio is expected to have no significant impact on (1) the number of consultations with the Service about the management of game-mammals, (2) the nature of the consultations, (3) DLNR's game management, (4) allowed hunting activity, (5) economic activity related to game hunting, (6) the value of game hunting to hunters, (7) the amount of Pittman-Robertson funding provided to the state for wildlife management projects (the amount is fixed by formula), or (8) wildlife-management projects that are partially funded under the Pittman-Robertson Act.

STATE PARKS, RECREATION AREA, AND CAMPGROUND

The proposed critical habitat for the O'ahu 'elepaio encompasses remote portions of two state parks, most of a State Recreation Area (SRA), and a state campground.

— Kaena Point State Park (5 acres in Unit 1)

Proposed critical habitat Unit 1 includes about 5 acres (about 1.3 acres *occupied* and 3.9 acres *unoccupied*) of the 779-acre Kaena Point State Park. This portion of the Park is in the mountains were there are no existing or planned park facilities or activities.

— Peacock Flats Campground (Unit 1)

The Peacock Flats campground is located in proposed critical habitat Unit 1. The improvements are located in an *unoccupied* portion of the proposed 'elepaio critical habitat, and no other listed species are near the improvements. While no specific park improvements are planned, the facilities must be maintained and are subject to occasional rebuilding and possible upgrades.

— Kahana Valley State Park (2,100 acres in Unit 3)

Proposed critical habitat Unit 3 includes about 2,100 acres (about 523 acres *occupied* and 1,578 *unoccupied*) of the 5,000-acre Kahana Valley State Park. The overlap occurs at the back portion of the valley and on the valley walls up to the ridgeline. This mountainous area contains no existing or planned park facilities, nor does it include the main loop trail. However, trails deep in the valley are subject to occasional maintenance and improvement.

— Keaiwa Heiau State Recreation Area (337 acres in Unit 3)

Unit 3 also includes about 337 acres (about 48 acres *occupied* and 289 acres *unoccupied*) of the 385-acre Keaiwa Heiau State Recreation Area (SRA), a popular and heavily used park.

Unit 3 contains most of the park improvements, including the loop road, parking areas, campsites, picnic tables, showers and restrooms, but not the *heiau* or the caretaker's cabin. While no specific park improvements are planned, the facilities must be maintained and are subject to occasional rebuilding and possible upgrades. The improvements are located in an *unoccupied* portion of the proposed 'elepaio critical habitat, and no other listed species are near the improvements.

Unit 3 also contains the popular Aiea Loop Trail which extends to the *occupied* portion of the critical habitat. This trail and connecting trails are subject to occasional maintenance and improvement.

Regarding the impact of the proposed critical habitat on state parks and recreational areas, the main concern is the improved portion of Keaiwa Heiau SRA and, to a lesser extent, Peacock Flats.

However, as discussed in Section 6, existing man-made features and structures that do not contain, and are not likely to develop, *primary constituent elements* are not included in the critical habitat designation. In effect, these features and structures are unmapped holes that are located within the boundaries of a critical habitat unit, but these holes are not considered by the Service to be part of the unit. In the case of Keaiwa Heiau SRA, redrawing the boundary of Unit 3 to exclude the improved portions of the SRA would make this explicit and would preclude unnecessary section 7 consultation costs.

Also, state park programs and projects are likely to be funded entirely by the state. Under these funding circumstances, there is no *Federal nexus* and therefore no requirement for section 7 consultations with the Service either for operations or maintenance, or for modifications and additions to park facilities.

In view of the above, the proposed critical habitat designation would have little or no economic impact related to state parks and recreational areas.

THE HAROLD L. LYON ARBORETUM

Deep in Manoa Valley, proposed critical habitat Unit 5 contains 111 acres of the 193.5-acre Harold L. Lyon Arboretum (the Arboretum), including most of the managed garden and unmanaged areas, but excluding the main structures (the herbarium, library, offices, gift shop, storage sheds, garages) and parking area. The portion of the proposed critical habitat Unit 5 that overlaps the Arboretum is *unoccupied,* but a few other listed species are near the Arboretum grounds.

The Arboretum, which is operated by the University of Hawai'i on state land, features acres of lush trees and plant vegetation with a Hawai'i/Pacific-Basin/Asian focus. Responsibilities of the Arboretum include: developing a major resource center for tropical plants, serving as an outdoor laboratory for students, introducing plants to the public, preserving and propagating germplasm of endangered plant species (especially those native to Hawai'i), developing a research and training program to restore Hawaiian ecosystems, and serving as a field station for terrestrial biology and stream biology. More recently, the Arboretum has dedicated itself to becoming a center for the rescue and propagation of rare and endangered Hawaiian plants. In addition to supporting academic pursuits, the Arboretum offers lectures, workshops, outings, etc., to the public through membership in its Lyon Arboretum Association.

The Arboretum receives Federal funds in support of various research projects, which establishes a *Federal nexus* for these projects but not for all operations.

The managed garden is being expanded slowly by a few acres a year. The expansion extends up the west side of Manoa Valley towards the base of the valley cliffs where it eventually must stop. While native trees and some exotic trees will be retained, weeds and less desirable trees will be replaced by forest vegetation that is more appropriate to the area. Federal funds are <u>not</u> being used to finance the expansion.

With regard to economic impacts, the managed garden is considered by the Service to be an existing man-made feature that forms an unmapped hole within the boundaries of the critical habitat unit, but it is not part of the unit. As such, operation and maintenance would not be affected by critical habitat designation (see Section 6). And the expansion of the managed garden has no *Federal nexus*, so it would not be subject to section 7 consultation if the Arboretum grounds were included in the critical habitat. Thus, the proposed critical habitat designation is expected to have little or no economic impact on the Arboretum.

Redrawing the boundary of Unit 5 to exclude the managed garden, and possibly the area planned for expansion, would make the hole explicit and would preclude unnecessary section 7 consultation costs.

DLNR NURSERY AND STAGING AREA

In Unit 1, the former Nike Station located in the mountains above Dillingham Air Field is used by DLNR as a nursery and a staging area for its forestry operations. Since this DLNR compound borders the range of the 'elepaio, it is within the geographic area that would be considered *occupied* by 'elepaio. Other listed species are also near the compound.

Critical habitat designation would have little or no economic impact on the nursery and staging-area operations because: (1) a *Federal nexus* for state-funded operations is unlikely, and (2) the operation and maintenance of this man-made feature amounts to an unmapped hole in the critical habitat unit (see Section 6). Thus, section 7 consultations probably would not be necessary, regardless of whether or not Unit 1 is designated as critical habitat. Even if consultation were to be required for a new project having a *Federal nexus*, because the compound is in the geographic area that would be considered *occupied* by the 'elepaio, the designation would not cause consultations or project modifications above and beyond what will already occur due to the existing species listings.

SATELLITE TRACKING FACILITY

In Unit 1, the U. S. Air Force operates a satellite tracking station at Mt. Ka'ala, the highest point on O'ahu. The site is sufficiently near the range of the 'elepaio to be within the geographic area that would be considered *occupied* by 'elepaio. Other listed species are also near the facility.

Because of the *Federal involvement*, the Facility is subject to section 7 consultation. However, operation and maintenance of this existing man-made facility would not be affected by critical habitat designation (see Section 6).

No known plans exist for expanding or adding to the satellite tracking facility. But, if expansions or additions occur some time in the future, they would be subject to section 7 consultation with or without critical habitat designation. Because the facility is located in the *occupied* portion of the critical habitat and other listed species are in the area, the proposed critical habitat designation would not cause consultations or project modifications above and beyond what will already occur due to the existing species listings. Thus, little or no economic impact would be attributable to the proposed critical habitat designation.

COMMUNICATIONS FACILITIES

The proposed critical habitat for the 'elepaio includes at least five communications complexes, each of which includes one or more towers that support broadcasting antennae and/or receivers, one or more appurtenant structures, a power source, and an access road or other means of access. These complexes include:

— Former Nike Station above Dillingham Air Field (Unit 1)

Within the compound of the old Nike Station (see the above subsection, "Staging Area and Nursery"), an old structure supports a number of antennae that provide North Shore coverage for the Honolulu Police Department, the Fire Department, Civil Defense, and other organizations. Eventually, the support structure will be replaced with a newer one.

As mentioned in a previous subsection, the compound is in the geographic area that would be considered *occupied* by the 'elepaio; other listed species are also near the compound.

— Mt. Ka'ala (Unit 1)

In addition to the satellite tracking facility discussed in the previous subsection, microwave relays provide a communications link between O'ahu and Kaua'i for Hawai'i Public Radio and the Pacific Missile Range Facility (PMRF).

As mentioned in the previous subsection, the facilities at Mt. Ka'ala are in the geographic area that would be considered *occupied* by the 'elepaio, and other listed species are also nearby.

— Palehua (Unit 2)

At the southern end of Unit 2, the 0.8-mile stretch of ridgeline below Palehua hosts the largest complex of communications towers on O'ahu. Users include the U.S. Army; PMRF, the U.S. Coast Guard, the Federal Aviation Administration (FAA); the National Weather Service; DLNR; Oceanic Cable; four television broadcasters; about half of O'ahu's FM-radio broadcasters; Verizon; and companies that provide cellular, mobile radio, and paging services.

From north to south, facilities within proposed critical habitat Unit 2 and covering 1/2-mile of the ridgeline include: a dense site with two 165-foot towers, three buildings, a rack tower 30+ feet high, and a collection of about nine telephone-pole towers; a microwave relay link used by Oceanic Cable to provide back-up service to downtown Honolulu and Kaua'i; a microwave relay link used by Verizon to provide back-up service to Kaua'i;

a 400-square-foot building under the control of the FAA; a commercial tower used by Channel 5 TV, Hawai'i Public Radio, and Ram Paging; and an FAA building and a tower over 100 feet high with a large collection of antennae. Additional towers and buildings are located just outside the boundaries of proposed Unit 2, including an 80-foot tower with a complex of antennae used by PMRF for electronic warfare, three television broadcasters, and about half of O'ahu's FM stations.

Additional towers are anticipated, including towers to accommodate television broadcasters for high-definition TV. Most of these towers are likely be built below the boundary of Unit 2, although it is possible that one or more new towers will be constructed within the unit. Existing and future towers must be sited on or near the ridgeline in order to provide adequate coverage.

Palehua is Oahu's premier site for communications because of its unique combination of attributes, including: (1) a favorable location that provides good coverage to most of the urban areas on O'ahu, major military bases, airspace surrounding Honolulu Airport, and surface water to the south and west of Oahu's major harbors out to a range of 65+ nautical miles; (2) a favorable location that allows microwave signals to be beamed to many relay stations on O'ahu and to Kaua'i; (3) sufficient acreage to site a large number of towers far enough from one another to avoid signal interference; (4) low visual impact because of the remote location; (5) good road access; (6) access to the electrical power grid; and (7) safety (i.e., no nearby apartment buildings and office buildings are affected by strong electromagnetic signals).

In 1990, when The Estate of James Campbell provided land to the TNCH for the Honouliuli Preserve, the Estate purposely omitted the ridgeline below Palehua from the Preserve because of the importance of the area for existing and planned communications towers and—based on discussions with DLNR—the absence of known threatened and endangered species. The native vegetation had already been disturbed, starting in 1934 when the military built a road to the ridge, and during subsequent years by other developments.

The area is in an *unoccupied* portion of the critical habitat, but other listed species are near Palehua.

— Tantalus (Unit 5)

At Tantalus, Verizon has two communications towers that provide a microwave relay link to other locations. One tower is at the top of Tantalus and the other is located 1/4-mile to the northeast.

The area is in an *unoccupied* portion of the critical habitat, but other listed species are near the two sites.

— Wiliwilinui Ridge (Unit 5)

Communications towers at the intersection of Wiliwilinui Ridge and the Ko'olau ridgeline support a microwave relay link, two FM radio antennae, and antennae for cellular, paging, and wireless services. Access to this remote site is by helicopter.

The area is in an *unoccupied* portion of the critical habitat, but other listed species are near the site.

All of these communications facilities have *Federal involvement*, either because they are Federal facilities or because a broadcasting permit is required from the Federal Communications Commission (FCC).

However, the operation and maintenance of these existing man-made facilities would not be affected by the critical habitat designation (see Section 6). Because the facilities do not contain, and are not likely to develop, *primary constituent elements* that are essential for the survival and recovery of the 'elepaio or any other listed species, they are unmapped holes that are located within the boundaries of a critical habitat unit, and are not considered by the Service to be part of the unit. In the case of the large complex at Palehua, which is at the southern end of Unit 2, redrawing the boundary to exclude existing improvements would make this explicit and would preclude unnecessary section 7 consultation costs.

Major modifications or additions to existing communications towers and appurtenant structures, or development of new ones, might be subject to section 7 consultation.

If a proposed improvement is built in an area that does not contain, and is not likely to develop, *primary constituent elements* essential for the survival and recovery of the 'elepaio or any other listed species—such as within the compound of the old Nike Station, most of Palehua Ridge, or on a site that is being rebuilt without expanding the footprint of the structure—informal consultation is likely to be minimal, and the Service would be likely to reach a "no *adverse modification"* conclusion during informal consultation, and no further consultation with the Service would be necessary. Except for the cost in time and effort to all parties involved in the informal consultation with the Service, the proposed project, land use, or activity would not be impacted by the critical habitat designation. The cost of the consultation would be near the low end of the range given in the above subsection, "Section 7 Consultation."

For planned improvements in *occupied* portions of the critical habitat (i.e., the old Nike Station and Ka'ala), the designation would not cause consultations or project

modifications above and beyond what will already occur due to the existing species listings. Little or no economic impact would be attributable to the proposed critical habitat designation.

If the planned improvement is in an *unoccupied* portion of the 'elepaio critical habitat, and other listed species are on or near the project site—possibly a portion of Palehua Ridge, and the entire Tantalus and Wiliwilinui sites—then section 7 consultation would already be required for those listed species, even without critical habitat designation. In this situation, critical habitat designation would result in the scope of the consultation being expanded beyond the other listed species to also consider whether the project would impact the *primary constituent elements* essential to the survival and recovery of the 'elepaio. Project modification to avoid adverse impacts on the 'elepaio critical habitat could range from no modification being necessary to moving the site of a project a short distance; the increase in cost could range from no increase to a modest amount

However, if adverse impacts on the 'elepaio critical habitat cannot be avoided, then a formal consultation would be required in order for the project to proceed (see Section 2). If the Service finds, in its biological opinion, that the project is not likely to destroy or *adversely modify* the critical habitat to the extent that it would appreciably diminish its value for the survival and recovery of the 'elepaio—even if the project may adversely affect the critical habitat—then the project can proceed without violating the ESA. Given the small footprint of a communications tower and appurtenant structure(s), it is probable that the consultation would end at this stage, resulting in little or no increase in costs being attributable to the critical habitat designation. Although it is unlikely, the Service could find that a proposed project is likely to destroy or *adversely modify* the critical habitat so as to appreciably diminish its value to the survival and recovery of the 'elepaio. In this situation, the Service would suggest reasonable and prudent alternatives that would keep the project below the threshold of *adverse modification.*

Finally, if the planned improvement is in an *unoccupied* portion of the critical habitat, and no other listed species are on or near the improvement—which is the case for most of Palehua Ridge at the southern end of Unit 2—then the critical habitat designation would trigger a section 7 consultation that would not otherwise be required. Depending upon the site conditions, the cost of the consultation is expected to fall within the range given in the above subsection, “Section 7 Consultation.” As in the previous paragraph, project modification to avoid adverse impacts to the 'elepaio critical habitat could range from no modification being necessary to moving the site of the project a short distance; the increase in cost could range from no increase to a modest amount But if adverse impacts cannot be avoided, then a formal consultation would be required for the project to proceed (see previous paragraph).

Although it is highly unlikely, the worst economic impact that could result from designating critical habitat for the 'elepaio would be that an important modification or addition to an existing communications facility would not be made, or a new facility would not be built at a proposed site or any other site, and this loss of development would be due directly to the designation, rather than to the listing. This would occur if (1) the project is proposed for an *unoccupied* portion of the critical habitat (Palehua would be the most likely location for a new project in an *unoccupied* area, assuming there is sufficient space for another structure without causing signal interference); (2) the project could not be modified at a reasonable cost to avoid *adversely modifying* the critical habitat so as to appreciably diminish its value for the survival and recovery of the 'elepaio; and (3) the project could not be moved to another site (e.g., to a site in Palehua just outside Unit 2). The probability of all three of these conditions occurring is slight, but is difficult to estimate without having information on a specific project. But if all three conditions do occur and, depending upon the nature of the proposed facility, the cost of losing such a project could be very high; e.g., a new communications tower critical to air-traffic control for aircraft converging on Honolulu International Airport, Hickam Air Force Base, and other military and civilian airports on O'ahu. Without a specific project, however, the potential economic cost is difficult to estimate.

In summary, the critical habitat designation is expected to have little or no economic impact on the operations and maintenance of communications facilities, and little to modest impact on the development of new facilities. However, as explained above, there is a slight probability of a very large economic impact.

POWER TRANSMISSION LINES

Five high-voltage power transmission lines (138 kV) transverse portions of two of the proposed critical habitat units: two cross Unit 3 with one of the lines passing through the *occupied* portions of critical habitat units (subpopulation M in Figure ES-1), and three units cross Unit 5 and pass through *occupied* areas (subpopulation K). In addition, lower voltage lines (46 kV) traverse other portions of the proposed critical habitat units.

Since these are existing structures and the main activity associated with them is operations and maintenance, they will not be impacted by the proposed critical habitat designation (see Section 6).

No plans have been announced to install new power transmission lines across the Wai'anae Range or the Ko'olau Range within proposed O'ahu 'elepaio critical habitat. But if, at some time in the future, such projects are proposed through one or more of the five proposed critical habitat units, they would not be subject to section 7 consultation as long as no Federal funds or permits are involved. But even if there is *Federal involvement* and section 7 consultation, project modification (if any) to avoid adverse impacts on the 'elepaio or

its habitat would likely be limited to the siting of support towers; the increase in cost could range from no increase to a modest amount. Power lines strung above tree level appear not to adversely affect 'elepaio as evidenced by the fact that 'elepaio currently are found in areas crossed by transmission lines.

Thus, the proposed critical habitat designation is expected to have little or no economic impact related to power transmission lines.

WATER SYSTEMS

As indicated in Table ES-1, water improvements are located in proposed critical habitat Units 1, 3, 4 and 5, and include gauging stations, wells, pumps, intake systems that divert water from streams, pipelines and major irrigation ditches to deliver mountain water to water tanks and reservoirs. These improvements are components of water systems that deliver potable water to homes in many areas of Honolulu, and deliver irrigation water to farms on the North Shore and to Central O'ahu and Waimanalo. They include systems operated by the Honolulu Board of Water Supply, the Hawai'i Department of Agriculture (Waiahole Ditch and Waimanalo Ditch), and private parties. As indicated in Table ES-1, many of the water improvements are located in *occupied* portions of the proposed 'elepaio critical habitat. For example, a major part of Waiahole Ditch, which is the largest and most extensive water diversion system on O'ahu, is located in an area having a high density of 'elepaio (subpopulation L in Figure ES-1).

These water improvements require periodic maintenance to insure that pumps continue to run, leaks are detected and repaired, vegetation is cleared from ditch systems, etc.

The operation and maintenance of these water improvements would not be subject to section 7 consultation with the Service for two reasons. First, the operation and maintenance are funded entirely by the state, county, and/or a private organization, with no *Federal nexus* that would trigger consultation. Second, these water improvements are existing man-made features and, as such, their operation and maintenance would not be affected by critical habitat designation (see Section 6). In summary, the proposed critical habitat designation would have no impact on the operation and maintenance of existing water improvements.

New water improvements could be subject to section 7 consultation if there is *Federal involvement,* such as funding from the U.S. Department of Agriculture to share in the cost of rebuilding an irrigation ditch system, or Federal permits under the Clean Water Act for projects that affect streams (e.g., improving a diversion dam, or replacing a high-maintenance flume that crosses a stream with a pipe syphon that is anchored on each side of the stream, etc.). However, it is highly unlikely that a new ditch system or a major expansion to an existing one would be proposed or approved. The reason for this is that such improve-

ments would directly or indirectly reduce stream flow, which would be a major environmental concern.

For new water improvements that have *Federal involvement* and planned for an area *occupied* by 'elepaio, the proposed designation would not require consultations or project modifications above and beyond what will already occur due to the existing species listing.

If the planned improvement is outside the current range of the 'elepaio, but other listed species are near the improvement then, even without the critical habitat designation, consultation will already be required due to the proximity of these other listed species. With the designation, the scope of the consultation would be expanded to consider whether the proposed improvements would impact the *primary constituent elements* essential to the survival and recovery of the 'elepaio.

And if the area is in the *unoccupied* portion of a critical habitat, and no other listed species are nearby, then the designation could result in new consultations to address whether the improvements would impact the *primary constituent elements* essential to the survival and recovery of the 'elepaio. The cost of consultation is expected to fall within the cost range given in the above subsection, "Section 7 Consultation."

Regarding the project modifications needed to avoid or minimize adverse impacts on habitats, the scope of the modifications and their costs would depend upon the circumstances. However, project modifications associated with rebuilding a portion of an existing water system are likely to be modest in view of the fact that water improvements exist in areas having high densities of 'elepaio.

TRAILS, ROADS AND HELICOPTER LANDING AREAS

Access to the forest areas within the proposed critical habitats is by numerous hiking trails, four-wheel-drive trails, unpaved access roads, a few paved roads, and helicopter landing areas. Many of these access improvements are in *occupied* portions of proposed critical habitat units (see Table ES-1).

Ongoing, planned, and expected access improvements include, but are not limited to:

— Honouliuli (Unit 2)

The contour trail in the Honouliuli Preserve is being improved to serve as a fire break to help protect the native forest. This trail traverses geographic areas that are currently *occupied* by the 'elepaio and other listed species, and other areas where no listed species are found.

— O'ahu Forest NWR (Unit 3).

New trails, four-wheel-drive trails, and helicopter landing areas are to be constructed to provide access to the O'ahu Forest NWR. The O'ahu Forest NWR is outside the current range of the 'elepaio, but a few listed species are found in or near the Reserve.

The maintenance of existing trails, roads, and helicopter landing areas would not be subject to section 7 consultation because they are existing man-made features (see Section 6). Also, access improvements having no *Federal involvement* would not be subject to consultation.

However, access improvements having *Federal involvement*, such as those in the O'ahu Forest NWR, would be subject to section 7 consultation. If the improvement is located in an area that is *occupied* by the 'elepaio, then consultation will already be necessary due to the existing species listing. In this situation, the 'elepaio critical habitat designation would cause little or no change in the section 7 consultations.

If the project is located in the *unoccupied* portion of the 'elepaio critical habitat, but another listed species is on or near a project site, then consultation will already be necessary due to the other species listing. In this situation, the scope of the consultation would be expanded to consider whether the proposed improvements would impact the *primary constituent elements* essential to the survival and recovery of the 'elepaio.

Finally, if a project is in the *unoccupied* portion of the 'elepaio critical habitat and no other listed species is present in the area (e.g., most of O'ahu Forest NWR), then the critical habitat designation would trigger a section 7 consultation that would not otherwise be required. The cost of consultation is expected to fall within the cost range given in the above subsection, "Section 7 Consultation."

If there is *Federal involvement*, project modification (if any) to avoid adverse impacts on the 'elepaio or its habitat would likely be limited to making adjustments to a route or resiting an improvement; the increase in cost could range from no increase to a modest amount.

URBAN DEVELOPMENT, WAILUPE VALLEY

Proposed Unit 5 includes about 64 acres of urban land located in back of Wailupe Valley, all of which is occupied by 'elepaio. Some time before 1970, residential development of this parcel was considered, but was abandoned because of unstable soils. In the late 1990s, a proposed cemetery was opposed by the affected community due to residents' concerns about traffic. Since then, the City and County of Honolulu purchased the property but has no plans for the land.

Current zoning of the 64 acres is General Preservation (P-2) which limits the development potential (see Section 3, subsection "County Land Management"). Given its location, the size of the parcel, its topography and soil conditions, surrounding land uses, and development restrictions, realistic development options include: (1) leaving the land in its natural state, (2) outdoor recreation, and (3) agriculture (e.g., a nursery, a truck farm, community gardens, etc.).

If a project proceeds that has no *Federal nexus,* then no section 7 consultation would be required even if the land is designated as critical habitat On the other hand, if there is *Federal nexus*, then the project would be subject to consultation and possible project modification. But since the project would be located on a parcel that is considered *occupied*, the critical habitat designation would not cause consultations or project modifications above and beyond what will already occur due to the existing species listing. Thus, little or no economic impact would be attributable to the proposed critical habitat designation.

OTHER PROJECT DEVELOPMENT

Unlike some critical habitat in other jurisdictions, no known plans exist for residential, commercial or industrial development in the proposed critical habitat units. Furthermore, proposals for such development are highly unlikely given the difficult mountain terrain and access, and existing land-use controls.

Similarly, the typical kinds of projects, land uses, and activities that would normally trigger section 7 consultations (such as Federally funded highway construction, permits from the Environmental Protection Agency to allow discharging of municipal or industrial wastes, and permits from the Army Corps of Engineers for activities affecting wetlands and streams) are highly unlikely in the proposed critical habitat units.

Nevertheless, some unforeseen future projects may arise. If projects are eventually proposed, and there is *Federal involvement*, then a critical habitat designation can be advantageous or disadvantageous to the project developers, depending upon the circumstances.

The main advantage of having designated critical habitat is afforded to developers who have some flexibility with regard to where they can site their projects. This flexibility may allow developers to site a project outside critical habitat boundaries, thereby avoiding issues related to endangered and threatened species. This might occur, for example, when siting communications towers for cellular-phone and paging services.

But even if there is no flexibility in siting a project, it can still be helpful to developers to know the boundaries of a critical habitat. If a project is located outside the

boundaries, then the developer can safely proceed with project planning with little or no risk of facing issues related to listed species. On the other hand, if a project is located inside a critical habitat and there is *Federal involvement*, then the developer knows that he should initiate contact with the Federal action agency to conduct informal consultations with the Service before proceeding with detailed site plans.

For developers, the main disadvantage of a critical habitat designation occurs when all of their project, or a portion of it, is proposed for siting in the *unoccupied* portion of a critical habitat. This situation would require a consultation with the Service by the Federal action agency and possible changes to the project that would not have been necessary with just a species listing.

U. S. MILITARY ACTIVITIES

As discussed below, three of the proposed critical habitat units overlap seven areas that are under the control of the U.S. military. Because of the *Federal involvement*, military projects and activities within these three critical habitat units would be subject to section 7 consultation with the Service. As discussed in Section 3, Integrated Natural Resources Management Plan (INRMPs) are being developed by the U.S. Army and Navy covering these seven military areas, the purpose of which is to integrate the mission of each military area with stewardship of the natural resources, including any listed species that may be found in the area.

Makua Military Reservation

About 853 acres of proposed critical habitat Unit 1 overlap Makua Military Reservation (Makua). The critical habitat area is in the back of Makua Valley and extends up to the valley rim, where slopes are steep and access difficult. About 307 acres are *occupied* and 547 acres are *unoccupied*. When both 'elepaio and the other listed species found in the area are taken into account, nearly all of the area is *occupied* by listed species.

U.S. Army activities at Makua include maneuver training and live-fire training. However, training was suspended in September 1998 due to community opposition following several wildfires that were ignited by military personnel using live ammunition. In preparing to resume training, the Army worked with the Service to study the impact of the fires on rare flora and fauna, and prepared an Environmental Assessment. In order to reduce fires, the Army is proposing to decrease the number of soldiers and Marines who can train in the valley at any one time. Also, missiles and tracer bullets would no longer be allowed.

The portion of proposed critical habitat Unit 1 that overlaps Makua is part of the safety zone for the military operations taking place in the valley below. No training activi-

ties occur within the proposed critical habitat unit, and none are planned. Furthermore, no significant improvements are located in this area, and none are scheduled.

Land-management practices include: 14+ miles of fence to control movement of ungulates; exclosure fencing to protect endangered plants from ungulates; goat and pig eradication, control of rodents, cats and mongoose during bird nesting season; firebreaks to contain fires emanating from training areas; grass cutting and use of herbicides to control vegetation along the firebreak roads; and two dip-ponds to provide a source of water to extinguish fires. The firebreaks are located outside the critical habitat unit. Noise studies have shown no adverse impacts on 'elepaio during live-fire training operations (VanderWerf).

The Service's draft recovery plan for the O'ahu 'elepaio calls for (1) additional fencing in Makua Valley to protect habitat from ungulates, and (2) eradication of ungulates from fenced areas. These measures are necessary to control ungulate populations in areas that are not open to public hunting and are unsafe for hunters due to unexploded ordnance.

The proposed critical habitat designation is expected to have little impact on operations and activities at Makua. This assessment is based on the current use of land as a safety zone (which will not be affected), the steep terrain and difficult access, and ongoing and planned efforts to control threats to the 'elepaio and other listed species (e.g., rodent and fire control). Anticipated changes arising from critical habitat designation would include: (1) expansion in the scope of section 7 consultations to consider impacts of military activities on 'elepaio habitat in areas that are not currently *occupied* by 'elepaio, and (2) possible expanded efforts at fire control. Assuming adequate fire control, the designation is likely to have little or no impact on live-fire and maneuver training. If the risk of fire cannot be controlled sufficiently, mitigation may be required, possibly including rodent control.

Thus, the proposed critical habitat designation is likely to have little economic impact related to military activities at Makua.

Schofield Barracks West Range

About 2,031 acres of proposed critical habitat Unit 1 overlap Schofield Barracks West Range (the West Range). The area is on the slopes below Mt. Ka'ala but above the firebreak where slopes are steep and access difficult. About 1,302 acres are *occupied* and 729 acres *unoccupied*. When both 'elepaio and the other listed species found in the area are taken into account, nearly all of the area is *occupied* by listed species.

The portion of proposed critical habitat Unit 1 that overlaps the West Range is part of the safety zone for the military operations taking place below the firebreak road, and is a flyover area for military helicopters. No training activities occur in the area and none are planned. Also, no significant improvements are located in this area and none are scheduled.

Land-management practices include: goat control by the USDA; rodent control during bird nesting season; maintenance of a firebreak to protect the area from fires emanating from training areas; and grass cutting and use of herbicides to control vegetation along the firebreak road. The firebreak is located outside the proposed critical habitat.

Noise studies have shown no adverse impacts on 'elepaio during live-fire training operations at the West Range (VanderWerf). In fact, the area hosts the third largest subpopulation of 'elepaio on the island, and has the highest density of 'elepaio (see Section 1).

The Service's draft recovery plan for the O'ahu 'elepaio calls for (1) fencing in West Range to protect habitat from ungulates, and (2) eradication of ungulates from fenced areas. These measures are necessary to control ungulate populations in areas that are not open to public hunting and are unsafe for hunters due to unexploded ordnance.

Based upon available information, the proposed critical habitat designation is likely to have little impact on operations and activities at the West Range. This assessment is based on the current use of the land as a safety zone (which will not be affected), the steep terrain and difficult access, and ongoing and planned efforts to control threats to the 'elepaio and other listed species (e.g., rodent and fire control). Anticipated changes arising from critical habitat designation might include increased efforts at fire control. Assuming adequate fire control, the designation is likely to have little or no impact on training activities. If the risk of fire cannot be controlled sufficiently, mitigation may be required, possibly including rodent control.

Thus, the proposed critical habitat designation is likely to have little economic impact related to military activities at the West Range.

Schofield Barracks South Range

About 322 acres of proposed critical habitat Unit 2 overlap the northern end of Schofield Barracks South Range (the South Range), much of which is steep, mountainous land. About 40 acres are *occupied* and 282 acres *unoccupied*. When both 'elepaio and the other listed species found in the area are taken into account, most of the area is *occupied* by listed species.

This portion of the South Range is in a safety zone that is used as a flyover area for helicopters. No training activities take place in this area and none are planned. Also, no significant improvements are located in this area and none are scheduled.

Land-management practices include: game hunting by military personnel and military retirees, rodent control, and fire control.

Based upon available information, the proposed critical habitat designation is likely to have little impact on operations and activities at the South Range. This assessment is based on the limited use of the land for training, the steep terrain and difficult access for a portion of the land, and ongoing and planned efforts to control threats to the 'elepaio and other listed species (e.g., rodent and fire control). Anticipated changes arising from critical habitat designation would include expansion in the scope of section 7 consultations to consider impacts of military activities on 'elepaio habitat in areas that are not currently *occupied* by the 'elepaio. Also, designation is expected to have little or no impact on training activities.

Thus, the proposed critical habitat designation is likely to have little economic impact related to military activities at the South Range.

Naval Magazine Pearl Harbor, Lualualei Branch (NAVMAG PH LLL)

About 1,675 acres of the west side of Unit 2 overlap NAVMAG PH LLL. This portion of NAVMAG PH LLL is in the back of Lualualei Valley extending up to the valley rim, where slopes are steep and access difficult. About 1,200 acres are *occupied* and 475 acres *unoccupied*. When both 'elepaio and the other listed species found in the area are taken into account, nearly all of the area is *occupied* by listed species.

The U.S. Navy stores munitions at Lualualei and operates communications equipment. However, the portion of NAVMAG PH LLL that would be in critical habitat Unit 2 is part of the safety zone for the magazines stored in the valley below. No military activities occur within the proposed critical habitat unit, and none are anticipated. Also, no significant improvements are located in this area and none are planned.

Land-management practices include: goat control by the USDA; limited game hunting to control ungulates; elaborate security fencing which helps keep animals from entering the property; an extensive system of firebreaks; brush control and fire prevention; and a full-service fire station on the property.

Based on available information, the proposed critical habitat designation is likely to have little impact on operations and activities at NAVMAG PH LLL. This assessment is based on the current use of the land as a safety zone (which will not be affected), the steep terrain and difficult access, and ongoing and planned efforts to control threats to the 'elepaio and other listed species (e.g., fire control). Anticipated changes arising from critical habitat designation would include: (1) expansion in the scope of section 7 consultations to consider impacts of military activities on 'elepaio habitat in areas that are not currently *occupied* by the 'elepaio, and (2) possible expanded efforts at fire control**.** The designation is expected to have no impact on storage of munitions, operation of communications facilities, or other military activities. If the risk of fire cannot be controlled sufficiently, mitigation may be required, possibly including rodent control.

Based upon available information, the proposed critical habitat designation is likely to have little economic impact related to military activities at NAVMAG PH LLL.

Kawailoa Training Area

The northern end of proposed critical habitat Unit 3 contains 4,348 acres (about 25%) of the Kawailoa Training Area (Kawailoa). This large area features numerous small valleys on the northeastern slope of the Ko'olau Mountains. Kawailoa is outside the current range of the 'elepaio, but a few listed species are found in the area.

The U.S. Army uses Kawailoa principally for helicopter training. The areas is also a state-managed Hunting Unit that is open to hunters on weekends and holidays.

Land-management practices include: exclosure fencing to keep pigs from entering a protected habitat, eradication of pigs from this exclosure, and public game hunting to help control ungulates.

Noise studies and helicopter flyovers of 'elepaio populations at the West Range suggest that the helicopter training at Kawailoa would have no adverse impacts on the 'elepaio should subpopulation(s) become re-established there.

Based upon available information, the proposed critical habitat designation is likely to have, at most, a modest economic on Kawailoa operations. Anticipated changes arising from critical habitat designation would include consultations to address impacts of the military activities on the 'elepaio critical habitat, with the cost falling within the range given above in the subsection “Section 7 Consultations.” The designation would have little or no impact on helicopter training activities.

Schofield Barracks East Range

About 2,266 acres of proposed critical habitat Unit 3 overlap Schofield Barracks East Range (the East Range), and abut the southern boundary of Kawailoa. Like its neighbor, the East Range features numerous small valleys on the northeastern slope of the Ko'olau Mountains. The East Range is outside the current range of the 'elepaio, but a few listed species are found in the area.

U.S. Army activities at the East Range include live-fire and maneuver training. Impact areas are not actively used, except for safety zones or as flyover areas for helicopters.

Land-management practices include game hunting by military personnel and military retirees to control ungulates. However, hazards associated with unexploded ordnance restrict ecosystem management.

Noise studies, live-fire training, and helicopter flyovers of areas *occupied* by 'elepaio at the West Range suggest that similar operations in the East Range would not adversely impact 'elepaio should subpopulation(s) become re-established there.

Based upon available information, the proposed critical habitat designation is likely to have, at most, a modest economic impact on operations at the East Range. Anticipated changes arising from critical habitat designation include section 7 consultations to address impacts of operations on the 'elepaio critical habitat, with the cost falling within the range given above in the subsection "Section 7 Consultations." Based upon available information, the designation is likely to have little or no impact on live-fire and maneuver training.

Fort Shafter

About 159 acres of the southern end of proposed critical habitat Unit 3 are located in Fort Shafter. The area, which is a narrow mountain valley, is outside the current range of the 'elepaio but is sufficiently near it to be considered partially *occupied* by 'elepaio. It is also partially occupied by other listed species.

This valley is inland of all known military improvements, operations, and activities, and none are anticipated in the valley.

Based on available information, the proposed critical habitat designation is likely to have little or no economic impact related to military activities at Fort Shafter—an assessment that reflects the lack of military or other activity in the affected area. Anticipated changes arising from critical habitat designation include possible section 7 consultations to address impacts of resource management on the 'elepaio critical habitat, with the cost falling within the range given above in the subsection "Section 7 Consultations." However, the designation is likely to have little or no impact on military activities at Fort Shafter.

RESIDENTIAL USE

The southern end of proposed critical habitat Unit 2 contains six cabins on leased land that are used as year-round residences. The cabins are outside the current range of the 'elepaio and no other listed species are nearby. Unit 3 contains about five homes in Waiahole Valley on state land, most of which are in the *occupied* portion of the unit. It is possible that a few other isolated homes exist in other areas proposed for critical habitat designation.

According to the landowner at the southern end of Unit 2, no additional cabins are planned for the area, nor are there any known plans for constructing homes in other parts of the proposed critical habitat.

A *Federal nexus* can exist if a property owner obtains a Federal housing loan or a loan guarantee to buy an existing home, refinance a home, or improve or expand a home. But if private financing is used, then no *Federal nexus* exists and the property owner is not subject to section 7 consultation.

Even if a *Federal nexus* does exist, historically, Federal agencies have not consulted on loans and loan guarantees for financing homes and home improvements. Furthermore, residential use of a developed property would be regarded by the Service as operations and maintenance of an existing structure, which is an acceptable use within a critical habitat. Also, any improvements made within the confines of a residential lot would not *adversely modify* the habitat containing the *primary constituent elements* that are essential for the conservation of the species. Thus, neither the residential use of a home nor home improvements would be impacted by the proposed critical habitat designation.

PROPERTY VALUES AND COSTS TO PROPERTY OWNERS

General Factors Underlying a Reduction in Property Value

An issue that is commonly raised by private landowners is that their property may lose value because all of it or portions of it are in a designated critical habitat. They fear that the designation would restrict potential uses of their land or increase their costs, thereby making the property less desirable and reducing its market value.

A reduction in property value need not have a factual basis. Perceptions of the impact of critical habitat designation can result in a temporary loss in property value if landowners or buyers believe that the critical habitat designation would restrict land uses, require modifications to the property, or cause project delays or other problems. Such a loss in property value can be incurred for as long as the perceptions persist.

Similarly, uncertainty about the impact of a critical habitat designation can cause a temporary reduction in land value that would continue until clear and correct information is distributed. To reduce the uncertainties, landowners may feel it necessary to retain counsel, land surveyors, biologists, and other specialists to determine the implications of the designation on their property. This can be particularly important for landowners who plan to sell their property and so must address concerns of potential buyers.

The intentional or unintentional misuse of critical habitat designation can also adversely affect property values. For example, opponents to development have been known to take the position in testimony before decision-making bodies that an entire critical habitat, by its very nature, should be preserved and that no development should be allowed within its boundaries. They have taken this position even if a project would not adversely

impact a listed species or its habitat, *jeopardize* the continued existence of a listed species, or destroy or *adversely modify* its critical habitat to such an extent that the project appreciably diminishes the value of the habitat for the survival and recovery of the species.

Potentially Affected Properties and Impacts on Property Values

The concern of private landowners about a possible decrease in property value due to critical habitat designation primarily involves land that is (1) located in the state's Urban, Rural or Agricultural Districts, and (2) suitable for eventual development or commercial use based on access, gentle slopes, proximity to infrastructure and services, etc.

However, no such private properties exist within the proposed critical habitat. All of the private lands are in mountainous areas having difficult access and terrain, and are within the State's Conservation District where land-use controls severely limit development and most other land uses. Thus, the proposed critical habitat designation would result in little or no loss of potential development or any other economic use that could affect private property values.

Regarding the land at the southern end of Unit 2 that is used for communications facilities, critical habitat designation conceivably could affect the siting of a new communications tower. Hypothetically, if a major new communications facility must be relocated outside Unit 2 in order to avoid adverse impacts, then the most likely location would be on land just south of Unit 2, which is owned by the same landowner. In the aggregate, this landowner would suffer little or no net loss in rents or property value. It is unlikely that a new tower appropriate for this area would be sited on another landowner's property because no sites of similar quality are available.

Regarding the few homes within this same area, they are on leased land and subject to use restrictions because of their location in the Conservation District. The proposed designation of critical would not restrict residential use of this land nor affect existing or potential lease rents from residential use. Consequently, the designation is unlikely to affect property values or leasehold values.

Regarding the few homes in Waiahole Valley, the land is leased from the State at below market rates, subject to transfer restrictions, and subject to use restrictions because of their location in the Conservation District. The proposed designation of critical would not restrict residential use of this land nor affect existing or potential lease rents from residential use. Furthermore, neither the land nor the leasehold properties are subject to sale on the open market. Consequently, the designation is unlikely to affect the leasehold values of the homeowners.

Costs to Property Owners

Some landowners may choose to investigate the implications of having all or a portion of their property located within a critical habitat, inquiring as to how the habitat designation may affect (1) use of their land (either through restrictions or new obligations) and (2) the value of their land. If a landowner engages the services of a land-use attorney to evaluate and draft a short report summarizing the implications of the critical habitat designation, the cost could be on the order of $4,000, based on 20 hours of effort at $200 per hour.

Potential for Higher O'ahu Property Values

Conceivably, some properties might increase in value with a critical habitat designation. For example, an O'ahu property could become more desirable, and thus more valuable, simply because some people see it as being special or unique because it is officially recognized as a habitat for the 'elepaio. Or the whole island might be viewed by many as being a more desirable place to live and visit because of its role in species conservation. A third possibility could be that land near designated critical habitat units could increase in value because this land would not be the focus of species conservation efforts.

However, any increase in value resulting from critical habitat designation is highly speculative and is likely to be insignificant.

ECOTOURISM

About a half-dozen companies on O'ahu offer nature tours that include mountain hikes in their menu of choices. Led by professional naturalist guides, the tours feature Hawai'i's unique ecosystems and endemic plants and wildlife, including 'elepaio and other birds. The half-day tours cost about $35 to $45 per person, and the tour groups range in size from about 6 to 12 visitors. Most of the mountain tours take place in proposed Units 3 and 5.

In addition, a few mainland organizations offer nature tours to Hawai'i to "collect" bird sightings, including sightings of the O'ahu 'elepaio. Each organization may offer one or two Hawai'i tours per year for groups ranging in size from 10 to 30 visitors. A tour may last as long as 2 weeks and may include a number of the islands.

Also, an unknown number of visitors engage in self-directed mountain hikes, taking advantage of public access to O'ahu's trails and the various guide books on trails, native birds, native plants, etc.

If the proposed critical habitat designation contributes to an increase in 'elepaio populations and an expansion of the bird's range—as well as that of other birds that would benefit (see the subsection below, "Benefits of Preserving Other Species")—this would contribute to Hawaii's visitor industry in two ways. First, hiking tours would be more rewarding because of increased sightings of 'elepaio and other birds. Second, with an expanded range, more trails could be hiked to view 'elepaio and other birds. With more opportunities to observe birds and more bird sightings, mountain hikes would be more attractive to bird watchers, and companies that market nature tours would be likely to offer more mountain hikes and would increase their marketing accordingly.

Such an increase in ecotourism is supported by the state in its plans for tourism because ecotourism contributes to an increased number of visitors, it has a low environmental impact, and it contributes to a more diversified and more stable visitor industry (The Hawai'i Tourism Authority).

Economic studies have not been conducted on the potential increase in tourism that would result from an increase in the number and range of 'elepaio and other birds. However, the magnitude of the potential economic impact can be illustrated based on the assumption that a sufficient number of new and repeat visitors can be attracted to Hawai'i or enticed to extend their stays, such that they would increase the average visitor census by a modest 10 visitors. Half of these visitors could be accommodated on nature tours using a single van. Under these assumptions, tourism in Hawai'i would increase by about 3,650 visitor-days per year (10 additional visitors x 365 days per year). Assuming an average visitor stay of 10 days, this is equivalent to attracting 365 additional visitors to Hawai'i each year, or about 30 more visitors each month. Visitor expenditures would increase by about $550,000 per year, based on average expenditures by each visitor of $150 per day. In turn, this increase in expenditures would translate into a $340,000 increase in gross state product, a $220,000 increase in household income, and 8.5 additional jobs (based on multipliers from the Hawai'i Input-Output Model). Doubling the increase in the visitor census to 20 additional visitors would double the economic impacts, etc.

Regarding the operators of commercial nature tours, designation of critical habitat would not subject the normal operations of these companies to section 7 consultation because there is no *Federal nexus*. However, if the designation contributes to an increase in 'elepaio populations and an expansion of the bird's range—as well as that of other birds that would benefit—this could contribute to increased business opportunities for these tour companies.

SMALL BUSINESSES

Under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to

publish a notice of rulemaking for any proposed or final Rule, it must prepare and make available for public comment a "regulatory flexibility analysis" that describes the effect of the Service's Rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of an agency certifies that the Rule will not have a significant economic impact on a substantial number of small entities. SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for making such a certification.

Small businesses having operations in the proposed critical habitat units include operators of nature tours. The impact of critical habitat designation on these operations is discussed in the previous subsection

RECOVERY FROM NATURAL DISASTERS

Although damage from hurricanes, earthquakes, and other natural disasters is not addressed as a land use in Section 5, a consultation with the Service would be required if financial assistance is sought from the Federal Emergency Management Agency (FEMA) to help residents, businesses or government recover from the occasional natural disaster in areas where there are critical habitat. In such emergencies, which could affect any and all critical habitat units, the Service expedites consultations.

If a FEMA project is located in an area that is *occupied* by the 'elepaio, the critical habitat designation would not cause section 7 consultations or project modifications above and beyond what will occur with the existing species listings. Thus, little or no economic impact would be attributable to the proposed critical habitat designation.

If the project is located in the *unoccupied* portion of the 'elepaio critical habitat, but another listed species is on or near the project site, then consultation will already be necessary due to the other species listing. In this situation, the scope of the consultation would be expanded to consider whether the proposed improvements would impact the *primary constituent elements* essential to the survival and recovery of the 'elepaio.

Finally, if a project is in the *unoccupied* portion of the 'elepaio critical habitat and no other listed species is present in the area, then the critical habitat designation would trigger a section 7 consultation that would not otherwise be required.

The most likely natural disaster to affect proposed critical habitat, and the one that would cause the most damage, would be a major hurricane passing over O'ahu. These are rare events. Historically, O'ahu has never been hit by a hurricane, but five have passed sufficiently close to have caused damage.

In the mountainous regions proposed for critical habitat, wind and water damage caused by a major hurricane would include downed trees and branches; washed out roads, trails, and irrigation ditch systems; and damage to communications facilities and power transmission lines; etc. Recovering from a natural disaster would involve clearing away downed trees, branches, and other debris, and rebuilding damaged structures.

As long as the hurricane recovery projects are planned in such a way that they avoid further damage to forests—which is likely to be the case—the proposed 'elepaio critical habitat designation would have little or no economic impact on FEMA projects following a hurricane and, by similar logic, following other natural disasters.

COST OF DERIVATIVE CHANGES IN LAND REGULATION AND LAND MANAGEMENT

A number of public and private landowners and land managers fear that critical habitat designation will, or could, result in derivative changes in land regulations and land management, and that these changes could be costly to them. The concern includes those changes which may be regarded as reasonably foreseeable, and extends to ones that could be indirect, unintended and unforeseen. Whether or not these concerns have merit, a number of them could still affect property values adversely—either temporarily or permanently (see above discussion in the subsection, "Property Values and Costs to Property Owners"). The concerns are addressed below.

New "Layer" of Land Regulation by the Service

A number of landowners and land managers view the proposed critical habitat designation as a new and potentially expensive "layer" of land regulation being imposed by the Service or, at the very least, the first step towards a new layer of land regulation. Emanating from this concern, they foresee likely new restrictions on the use of their lands, additional costs and delays in obtaining project approvals, and more expenses associated with how they manage their lands. Furthermore, they anticipate that government funding will be inadequate for the agencies to manage their expanded responsibilities properly, including funding for partnership programs.

The concern has little or no basis in fact for about half of the proposed critical habitat, but does have limited factual basis for the other half. Even so, the Service is proposing critical habitat designation for the 'elepaio because it is mandated by law. Starting with the area where the concern has essentially no basis in fact, about 21% of the proposed critical habitat is *occupied* by 'elepaio. For this portion of the proposed designation, Federal action agencies currently must consult with the Service about projects that have *Federal involve-*

ment and are located in the vicinity of listed species. Furthermore, there should be little or no change in the scope of the consultations, and little or no change in the recommendations made by the Service. In short, the practical effect is that the critical habitat designation would not add a new layer of land regulation for the *occupied* portions of critical habitat units.

About 30% of the proposed critical habitat is *unoccupied* by 'elepaio, but is *occupied* by other listed species. For these areas, the proposed designation is not expected to increase the number of consultations with the Service but, with 'elepaio critical habitat designation, the scope of consultations would expand to consider whether the projects and activities would impact the *primary constituent elements* essential to the survival and recovery of the 'elepaio. This is not a significant change in land management, however. The number of affected consultations is expected to be small and project modifications modest because nearly all of this land is located in the Conservation District where land use, development, and most activities are severely restricted—particularly developments that could directly or indirectly destroy forest areas.

Finally, approximately half of the acreage proposed for critical habitat designation is *unoccupied* by 'elepaio, and no known listed species are present. This acreage would become subject to a new layer of management by the Service. But, as above, this is not a significant change in land management. The number of additional section 7 consultations is expected to be small and project modifications modest because nearly all of this land is in the Conservation District where land use, development, and most activities are severely restricted—particularly developments that could directly or indirectly destroy forest areas.

"Creeping Federalism"

Another concern is "creeping federalism" as represented by future expansion of government regulations that ultimately diminish private-property rights.

This concern, although genuine, is speculative and too vague (i.e., it is not "reasonably foreseeable") to submit to an accurate economic impact assessment. If additional Federal regulations are proposed, they should be evaluated at the time they are proposed, and the evaluation should be based on the specifics of the proposed regulations.

Concern about Condemnation of Property at Depressed Land Values

Some landowners suspect that, following designation of critical habitat, the Service eventually will condemn private property at depressed land values. However, the Service is not proposing nor is it contemplating purchasing any land that is being proposed for critical habitat designation.

On occasion, the Service does purchase land (e.g., land for a refuge). But a proposed purchase of land would be an action separate from the proposed critical habitat designation. As such, any proposed land purchase should be evaluated at the time it is proposed, and should be based on what is actually proposed. When the Service does purchase private property, the normal practice is to do so only when (1) the landowner is willing to sell the land and (2) the price and other terms are acceptable to the landowner.

Also, all of the privately owned land being proposed for designation is located in the Conservation District where land values already reflect severe limitations on development and most land uses.

Potential changes in property values due to critical habitat designation are discussed in the subsection, "Property Values and Costs to Property Owners."

Concern about State Redistricting of Land

Another concern is that once privately owned land is designated as critical habitat, the state will redistrict it from the Agricultural, Rural or Urban District to Conservation. If such redistricting were to occur, then economic impacts would include: (1) a substantial reduction in the value of the land that is redistricted, (2) a reduction in economic activity, and (3) the added burden and cost of managing the additional land placed in the Conservation District. A further and related concern is that the cost of managing additional lands placed in the Conservation District could strain limited budgets of private landowners, government agencies that manage public lands, and government agencies that fund partnership programs. Without increased funding to manage additional lands placed in the Conservation District, the quality of land management is likely to deteriorate, resulting in inadequate control of ungulates, inadequate weed control, increased fire hazard, etc.

However, these concerns are not do not pertain to the proposed critical habitat designation for the O'ahu 'elepaio because all of the privately owned lands are already in the Conservation District.

Even if some privately owned lands proposed for designation were in Agricultural, Rural or Urban District, state redistricting of private land from a higher economic use (i.e., Agricultural, Rural, or Urban) to a lower one (i.e., Conservation) is possible, but uncommon. This is because private landowners strongly oppose proposals to redistrict their lands if they believe this might result in a substantial decrease in the value of their property and/or a loss in the economic use of their lands. Furthermore, they may file lawsuits claiming an unconstitutional taking of property. But in the unlikely event that the state were to propose redistricting land to a lower economic use, then this would be a separate action from critical habitat designation. The evaluation of any proposed redistricting should be made at the time it is proposed, and should be based on its merits.

Concern about Court-Ordered Expansion of Land Management

Some landowners fear that critical habitat designation eventually could result in a new court-ordered requirement that their lands be managed to protect threatened and endangered species and their habitat. For the 'elepaio, this would include expensive rodent control for large areas of forest lands, and possibly other measures to control threats (see "Land Management to Protect Critical Habitat"). In effect, they fear that conservation efforts that are now voluntary would become mandatory, and that a larger financial burden could fall on them because government cost-sharing programs may be inadequate to fund all the lands proposed for critical habitat. Voluntary cost-sharing programs include the Service's Conservation Partnerships Program, NRCS's Wildlife Habitat Incentives Program, and the state's Natural Area Partnerships Program (see Section 3).

The speculation is that, as a result of a lawsuit, a Federal (or state) court could mandate conservation management of all lands that are designated as critical habitat, with the legal decision based on the *taking* provisions of the ESA. Under Federal law, prohibited activities include the *taking* of wildlife listed as endangered (see Section 2). Furthermore, the restrictions on *takings* apply to actions that destroy or alter habitat of a listed species, and cover all projects and activities regardless of any *Federal involvement*. Continuing with the speculation, allowing rodents to roam free could be viewed as an activity that degrades a critical habitat and therefore amounts to a *taking* of the 'elepaio. The argument is similar to the one that was used successfully in Federal court to order the eradication of sheep and goats on Mauna Kea in order to protect the habitat of the endangered palila bird (discussed in the subsection on "Game Hunting").

However, the argument and the analogy are invalid. In the palila case, the state was directly responsible for releasing sheep and goats and promoting their populations for game hunting. For 'elepaio, the crucial difference is that rats were brought to Hawai'i by accident and have expanded on their own; they are not present due to the actions of landowners. If a landowner actively released rats or promoted their populations in some way, then the above argument would be true, but this is not the case.

Increased Opposition to Development

Landowners and developers are concerned that critical habitat designation could result in increased opposition to development of their lands. The opposition could take the form of testimony before various state and county decision-making bodies, or a lawsuit designed to substantially change or block a project, with the basis of the argument being that lands designated as critical habitat should be protected. Even if landowners and developers are ultimately successful in receiving approvals for their projects, overcoming increased opposition could be costly for them in terms of their lost time, out-of-pocket expenditures and project delays.

If a controversial project is proposed for a location within the proposed critical habitat, this concern could prove to be valid. However, the number of affected projects is expected to be small and could possibly be zero. As discussed in Section 5, little development is expected in the proposed critical habitat units because of (1) rugged mountain terrain, lack of access, and remote locations, and (2) restrictive land-use controls within the state Conservation District.

Reduced Cooperation

Some parties fear that the ongoing activities of the Service to designate critical habitat for various species could cause some landowners to cooperate less with the Service, NRCS, and DLNR because they are uncertain about allowable uses of designated land, new restrictions, new land-management obligations, etc. By not cooperating, the landowners would hope to avoid the possibility of having listed species discovered on their lands or having their lands identified as favorable habitat for one or more listed species. More to the point, the landowners would hope to avoid having their lands designated as critical habitat, thereby protecting existing property rights and property values.

Reduced cooperation from landowners, which in fact has occurred on occasion, may include refusal to allow biological surveys of their land, or refusal to participate in watershed and conservation partnership programs sponsored by the Service, NRCS and DLNR. In turn, this could result in lower-quality land management, environmental degradation, and increased risks to native plants and wildlife. If the environmental changes were to be appraised, they could reflect an economic loss to society.

Any change from the current level of cooperation by landowners will depend on actual and perceived restrictions on land use and development due to critical habitat designations in Hawai'i as well as in other states.

For the O'ahu 'elepaio, the proposed critical habitat designation is expected to have a modest impact on land use and development over and above existing restrictions on activities at the higher elevations of the Wai'anae and Ko'olau ranges. Thus, as landowners gain experience with the actual effects of the 'elepaio critical habitat, this particular designation is not expected to measurably diminish cooperation on the part of landowners with government agencies.

BENEFITS OF PRESERVING O'AHU 'ELEPAIO

The primary intent of critical habitat designation is to protect areas that are needed to preserve endangered and threatened species. Critical habitat designation can also help edu-

cate the unaware landowner or land manager about the importance of managing their land to protect the habitat of the 'elepaio.

If these endeavors are successful, the Service estimates that the potential population of 'elepaio in the areas proposed for critical habitat designation could reach a sustainable level of about 10,100 birds, compared to less than 1,800 breeding birds currently on O'ahu (see Section 1). Over the long term, this would contribute to greater biodiversity and healthier ecosystems, and enhanced opportunities for scientific experts to study 'elepaio. In addition, many people derive satisfaction simply from knowing that the endangered 'elepaio is being saved and that it will be on earth for future generations to appreciate—even if they may never personally observe the bird.

Related to the benefit of preserving the 'elepaio is the benefit of preserving and perpetuating the cultural and mythological aspects of a bird that has special importance in Hawai'i. 'Elepaio were important in Hawaiian mythology and folklore and appeared in many Hawaiian legends (VanderWerf; Holmes). They were often the first birds to sing in the morning, and their songs were thought to warn the night spirits that their work must end because dawn was approaching. They were also considered the '*amakua* (guiding spirit) of the Hawaiian canoe-builder because they played a role in his efforts to select the perfect rot-free *koa* log for his canoe. When a *koa* tree was selected and felled, an 'elepaio hopefully would alight on the felled tree. If it ran along its trunk from one end to the other without stopping to peck, and sang *ono ka i'a* ("sweet the fish"), the canoe-builder would declare the log perfect for a canoe. But if the bird stood on the tree trunk and remained there for some time or pecked at it, the canoe-builder knew that a defect (decay, hollow-core, knot) existed at that point on the trunk. The explanation was that insects and grubs in its trunk were propelled to the surface when the tree crashed to the ground.

Finally, if the proposed critical habitat designation culminates in the successful recovery of O'ahu 'elepaio, then related benefits would be: (1) reduced internal costs to the Service and to the other Federal agencies that are involved in consultations on the species; (2) reduced internal costs for the non-Federal applicant, if any; and (3) reduced costs for biological assessments (for cost estimates, see the previous subsection, "Section 7 Consultations").

No known studies have focused on the economic value of preserving the O'ahu 'elepaio and, given the scope of this analysis, no primary economic research was conducted. However, studies that have been done on other endangered birds provide insight into the magnitude of the benefits of preservation. For example studies indicate that households are willing to pay an average of $10 to $15 per year to preserve the red-cockaded woodpecker, with the difference reflecting different studies (Loomis and White). For other birds, the figures are $15 to $33 per year for the American bald eagle, $35 per year for the whooping crane, and $44 to $95 per year for the northern spotted owl. Another study indicates a willingness to pay a lump-sum amount of $216 to preserve the American bald eagle. In the case

of the spotted owl, the high value could reflect the desire to save ancient forests from logging.

Based on these studies, a reasonable estimate of the average dollar amount that O'ahu households would be willing to pay to preserve the O'ahu 'elepaio is $15 per year. For all households on O'ahu, the amount would be about $4.3 million per year ($15 x about 864,600 residents in 1999 and an average of 3 people per home).

This potential benefit would be attributable only partially to the proposed critical habitat designation. It also reflects the listing of the O'ahu 'elepaio as endangered, and land management to control threats to the 'elepaio (e.g., rodent control).

BENEFITS OF PRESERVING OTHER SPECIES

As discussed in the subsection "Land to Protect Critical Habitat," the survival and ultimate recovery of O'ahu 'elepaio will involve rodent control. In turn, rodent control will contribute to the survival and recovery of a number of other native birds, snails and plants found in the mountainous areas proposed for critical habitat. These species include:

— Native Birds

- 'Apapane (*Himatione sanguinea*)
- O'ahu 'i'iwi (*Vestiaria coccinea*), which is on the state endangered species list, but not the Federal list
- O'ahu 'amakihi (*Hemignathus chloris*)
- O'ahu creeper (*Paroreomyza maculata*), which is on both the federal and state endangered species lists, but may be extinct.
- O'ahu pu'eo or Hawaiian short-eared owl (*Asio flammeus sandwichensis*), which is on the state endangered species list, but not the federal list.

— Native Tree and Ground Snails Listed as Endangered

- *Achatinella mustelina*
- *Achatinella fulgens*
- *Achatinella apexfulva*
- *Amastra micans*
- *Amastra spirozona*
- *Laminella sanguinea*

— Native Plants Listed as Endangered

- *Gardenia mannii*
- *Labordia cyrtandrae*
- *Alcinodendron obovatum*
- *Alectryon macrococcus* var. *macrococcus*
- many species in the *Lobelia* family (*Campanulaceae*), including species in the genera *Cyanea, Clermontia, Lobelia* and *Trematolobelia*.

In addition, other native plants and native insects that are not listed would benefit from rodent control. Also, some ten alien birds would benefit, but some experts believe that alien birds may compete with 'elepaio and other native birds for food and space.

The economic value of these additional preservation benefits are not estimated because of (1) the difficulty of quantifying the net changes that can be attributed to the critical habitat designation and (2) the lack of relevant economic studies on the value of the changes.

SUMMARY OF FINDINGS

The economic impacts of the proposed critical habitat designation for the endangered O'ahu 'elepaio would range from no impact to modest impact on the following projects, land uses, and activities within the proposed critical habitat units:

— game hunting

— state parks, state recreation area, and campground

— The Lyon Arboretum

— a DLNR nursery and staging area

— a satellite tracking facility at Ka'ala

— communications facilities

— power transmission lines

— water systems

— trails, roads, and helicopter landing areas

— urban development in Wailupe Valley

— U.S. military activities

— property values

— small businesses

— recovery from natural disasters

These findings reflect the fact that very few new developments, commercial projects, land uses, and activities are expected in the five proposed critical habitat units. This is due to (1) lands that are largely unsuitable for development and most other activities because of their rugged mountain terrain, lack of access, and remote location; and (2) existing land-use controls that severely limit development and most other activities in the mountainous areas of O'ahu.

Also, a number of projects and activities in the proposed critical habitat would not be subject to section 7 consultation because there is no *Federal involvement,* or activities involve the operation and maintenance of existing man-made facilities, or the projects or activities would not impact the *primary constituent elements* essential to the survival and recovery of the 'elepaio. And for some projects, the incremental economic impacts over and above the economic impacts that would have occurred under existing Federal and state protections would be small or negligible.

Economic benefits occurring as a result of designating critical habitat for the O'ahu 'elepaio, and the related actions taken to control threats to the 'elepaio (principally rodent control), would include: (1) the economic benefits of preserving the 'elepaio, (2) the economic benefits of preserving other species that would increase in number and range as a consequence of the rodent control, and (3) an expansion in ecotourism.

A more detailed summary of the economic impacts is presented in the Executive Summary.

REFERENCES

Bier, James A. Map of O'ahu . University of Hawai'i Press, Honolulu, Hawai'i. 1997.

City and County of Honolulu. *General Plan,* Land Use Ordinance (1999), and District Development Plans (1996 - 2000).

City and County of Honolulu. GIS Parcel Maps and Data for O'ahu.

DeLorme. *Hawai'i Atlas & Gazetteer, Topo Maps of the Entire State, Guide to Outdoor Recreation*. Yarmouth, Maine. 1999.

Donnelly, Dennis M., and Louis J. Nelson. "Net Economic Value of Deer Hunting in Idaho." *USDA Forest Service Resource Bulletin RM-13.* Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado. 1986.

Fairbank, Maslin, Maullin & Associates, and QMark Research & Polling. "Highlights of Maui County Voter Survey." For The Trust for Public Land. May 30, 2000.

"Hawai'i Fishing News" (hunting articles). Honolulu, Hawai'i. Monthly.

Holmes, Tommy. *The Hawaiian Canoe.* Editions Limited, Honolulu, Hawai'i. 1993.

Juvik, J.O., and S. P. Juvik. "Mauna Kea and the Myth of Multiple Use Endangered Species and Mountain Management in Hawai'i." *Mountain Research and Development.* Hilo, Hawai'i. 1984.

Hawai'i Tourism Authority. "Ke Kumu. Strategic Directions for Hawaii's Visitor Industry." June 1999.

Kaiser, Brooks, and Nancy Krause, Dee Mecham, Jessica Wooley and James Roumasset. *Environmental Valuation and the Hawaiian Economy* (Draft). Honolulu, Hawai'i. September 1999.

Ko'olau Mountains Watershed Partnership. "Ko'olau Mountains Watershed Partnership Memorandum of Understanding." August 1999.

Loomis, J.B. and White, D.S. "Economic Benefits of Rare and Endangered Species: Summary and Meta-analysis." *Ecological Economics.* 1996.

Map, Hawaiian Islands. Nelles Verlag, Federal Republic of Germany.

Morgan, Joseph R. *Hawai'i, A Unique Geography*. Bess Press, Honolulu, Hawaii. 1996.

Shulstad, Robert N., and Herbert H. Stoevener. "The Effects of Mercury Contamination in Pheasants on the Value of Pheasant Hunting in Oregon." *Land Economics.* February 1978.

State of Hawai'i, Department of Business, Economic Development & Tourism. *The Hawai'i Input-Output Study: 1992 Benchmark Report.* Honolulu, Hawai'i. December 1998.

State of Hawai'i, Department of Business, Economic Development & Tourism. *The State of Hawai'i Data Book, A Statistical Abstract.* Honolulu, Hawai'i. 1998 and 2000.

State of Hawai'i, Department of Land and Natural Resources. "Conservation District." Hawai'i Administrative Rules, Title 13, Subtitle 1, Chapter 5. Honolulu, Hawai'i.

State of Hawai'i, Department of Land and Natural Resources. "Indigenous Wildlife, Endangered and Threatened Wildlife, and Introduced Wild Birds." Hawai'i Administrative Rules, Title 13, Subtitle 5, Forestry and Wildlife, Part 2, Wildlife, Chapter 124. Honolulu, Hawai'i.

State of Hawai'i, Department of Land and Natural Resources. "Rules for Hawai'i Statewide Trail and Access Program." Hawai'i Administrative Rules, Title 13, Subtitle 5, Forestry and Wildlife, Part 3, Na Ala Hele, Chapter 130. Honolulu, Hawai'i.

State of Hawai'i, Department of Land and Natural Resources. "Rules Regulating Activities within Forest Reserves." Hawai'i Administrative Rules, Title 13, Subtitle 5, Forestry and Wildlife, Chapter 104. Honolulu, Hawai'i. October 1993.

State of Hawai'i, Department of Land and Natural Resources. "Rules Regulating Game Bird Hunting, Field Trials and Commercial Shooting Preserves." Hawai'i Administrative Rules, Title 13, Chapter 122. Honolulu, Hawai'i. November 1999.

State of Hawai'i, Department of Land and Natural Resources. "Rules Regulating Game Mammal Hunting." Hawai'i Administrative Rules, Title 13, Chapter 123. Honolulu, Hawai'i. November 1999.

State of Hawai'i, Department of Land and Natural Resources. "Rules Regulating Wildlife Sanctuaries." Hawai'i Administrative Rules, Title 13, Chapter 125. Honolulu, Hawai'i. 1981.

State of Hawai'i, Department of Land and Natural Resources. "State Parks." Hawai'i Administrative Rules, Title 13, Subtitle 6,Chapter 146. Honolulu, Hawai'i. June 8, 1999.

State of Hawai'i, Department of Land and Natural Resources. "State Parks on the Island of Maui." Honolulu, Hawai'i.

State of Hawai'i, Department of Land and Natural Resources. "Threatened and Endangered Plants." Hawai'i Administrative Rules, Title 13, Subtitle 5, Forestry and Wildlife, Part 1, Forestry, Chapter 107. Honolulu, Hawai'i. May 15, 1997.

State of Hawai'i, Office of Environmental Quality Control. "A Guidebook for the Hawai'i State Environmental Review Process." Honolulu, Hawai'i. October 1997.

State of Hawai'i, Office of Environmental Quality Control. "Content Guidelines for Biological Surveys, Ecosystem Impact Analysis." Honolulu, Hawai'i. August 11, 2000.

State of Hawaii, Office of Environmental Quality Control. "The Environmental Notice." Honolulu, Hawai'i. Monthly.

State of Hawai'i, Office of Planning. GIS Maps for O'ahu.

Stearns, Harold T. *Geology of the State of Hawaii.* Pacific Books, Palo Alto, California. 1966.

Supreme Court of the United States, Opinion 94-859. *Bruce Babbitt, Secretary of the Interior, et al., Petitioners v. Sweet Home Chapter of Communities for a Great Oregon, et al.* June 29, 1995.

The Nature Conservancy of Hawai'i. *Honouliuli Preserve Master Plan*. Honolulu, Hawai'i. 2001.

The Research Corporation of the University of Hawai'i. Army Natural Resource Center, Schofield Barracks, Hawai'i. *U.S. Army Garrison Hawai'i O'ahu Training Areas Natural Resource Management, Final Report.* August 2000.

U.S. Court of Appeals, Tenth Circuit. *New Mexico Cattle Growers Association, et al v U.S. Fish and Wildlife Service*. No. 00-2050. Filed May 11, 2001.

U.S. District Court for the District of New Mexico. *Middle Rio Grande Conservancy District v. Bruce Babbit.* No. CIV 99-870, 99-872 and 99-1445M/RLP (consolidated).

U.S. Department of Agriculture, Soil Conservation Service in cooperation with The University of Hawai'i Agricultural Experiment Station. *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawai'i.* Washington, D.C. August 1972.

U.S. Department of the Interior, Fish and Wildlife Service, and National Marine Fisheries Service. *Consultation Handbook, Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act.* (Final) March 1998.

U.S. Department of the Interior, Fish and Wildlife Service, Division of Economics. *1996 National and State Economic Impacts of Wildlife Watching, Based on the 1996 National Survey of Fishing, Hunting and Wildlife-Associated Recreation*. Arlington, Virginia. April 1998.

U.S. Department of the Interior, Fish and Wildlife Service. *1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation Hawai'i.* FHW/96-HI. March 1998.

U.S. Department of the Interior, Fish and Wildlife Service. "Endangered and Threatened Wildlife and Plants; Proposed Determination of Critical Habitat for the O'ahu 'Elepaio," 50 CFR Part 17. June 6, 2001.

U.S. Department of the Interior, Fish and Wildlife Service. *Environmental Assessment: Proposed O'ahu Forest National Wildlife Refuge, Island of O'ahu, Hawai'i.* March 2000.

U.S. Department of the Interior, Fish and Wildlife Service. *Federal Aid in Wildlife Restoration (Pittman-Robertson)*. August 28, 2000.

U.S. Department of the Interior, Fish and Wildlife Service. *Palila Recovery Plan.* Honolulu, Hawai'i. January 23, 1978.

U.S. Geological Survey. Maps of O'ahu, Hawai'i. U.S. Defense Mapping Agency Hydrographic/Topographic Center, Washington, D.C. 1983.

Office of Management and Budget, The White House. "Circular No. A-94, Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs." October 29, 1992.

U.S. Office of Management and Budget, The White House. "Executive Order 12866, Regulatory Planning and Review." September 30, 1993.

VanderWerf, Eric. Y. Ebisu and Associates and Wil Chee-Planning, Inc. *A Study to Determine the Effects of Noise from Military Training on the endangered O'ahu 'Elepaio.* July 2000.

VanderWerf, Eric A. "'Elepaio." *The Birds of North America.* 1998.

Young, John S., Dennis M. Donnelly, Cindy F. Sorg, John B. Loomis, and Louis J. Nelson. "Net Economic Value of Upland Game Hunting in Idaho." *USDA Forest Service Resource Bulletin RM-15*. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado. 1986.

Information was provided in communications with representatives of :

- City and County of Honolulu
- Earthjustice Legal Defense Fund
- Harold L. Lyon Arboretum, University of Hawai'i
- Hawai'i Agriculture Research Center
- Hawai'i Department of Agriculture
- Hawai'i Department of Land and Natural Resources
- Hawaiian Electric Company
- Honolulu Board of Water Supply
- Industrial Economics, Inc.
- O'ahu Nature Tours
- Pacific Legal Foundation
- Pig Hunters' Association
- U.S. Army
- U.S. Department of Agriculture (USDA), Federal Farm Service Agency
- U.S. Fish and Wildlife Service Field Office
- U.S. Navy
- USDA, Natural Resources Conservation Service